BASIC LAND INFORMATION STORAGE AND RETRIEVAL SYSTEM: BLISTORS, MAY 1977

Coryell A. Ohlander

B A S I C

L A N D

I N F O R M A T I O N

S T O R A G E

and

R E T R I E V A L

S Y S T E M

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B L I S T O R S

MAY 1977

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Land Inventory

A CONCISE

DESCRIPTION
and set of

INSTRUCTIONS
for
Computer
Assistance
for
Manipulation
Extraction
Area Computation
Field and Plot Data
Library Indexing
Ecosystem
Technical
Coefficients

**
BATCH
and
TIMESHARE
Ft. Collins
Computer
Center
**

BASIC LAND INFORMATION STORAGE AND RETRIEVAL SYSTEM

A Computer Assisted System for Manipulation
of Map Information, Field Data, Library Indexes
and Ecosystem Technical Coefficients

by

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This System is Section 2 of the Computer Assistance Notebooks available in Region 2's River Basin Studies

Section 1 Operable Planning Concepts
Section 2 Basic Land Information and Storage System
Section 3 Large Computer Programs for Simulation and Analysis
Section 4 Basic Land Relationships
Section 5 Small Computer Programs for Basic Land Relationships

PROGRAMMING AND COMPUTER USE ASSISTANCE

Contributions in interest and experience and expertise from Bill and Stu are greatly appreciated. For further help contact:

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SCRATCH RECORD OF TAPES

Tape Number	Number of Records	Name and Comment

Relationship of this Paper to

MULTI-OBJECTIVE PLANNING

* * *

A. Outline of the Steps Used In River Basin Programs To Meet the Water Resource Council's Principles and Standard for Multi-Objective Water and Related Land Resources Planning

1. Identifying Problems, Needs, Desires, Preferences. Specify components of two objectives - National Economic Development and National Environmental Quality. Blend local and state input with national direction to insure meeting planning responsibilities and purpose.

2. Project Future Conditions. Describe demands for outputs under alternative futures in terms of quantity, quality, and time relationships.

3. Analyze Resource and Management Capabilities. Determine amounts of outputs that will be available under existing management contracts and plans. Identify component needs as the difference between anticipated demands and the amounts of outputs available under existing management contracts and plans.

4. Identify Actions and Opportunities to Satisfy Needs. Identify a spectrum of ways and means that can help attain the desired beneficial effects and meet the anticipated demands. Identify the nature of the risks - economic, environmental, legal, or social - and the weakness associated with the ways and means that would tend to limit attainment.

5. Formulate Alternative Plans to Satisfy Needs. Structure plans to achieve varying levels of contributions to the specified components of the multi-objectives. Show component outputs that are complementary to both NED and EQ objectives.

6. Test each plan for public acceptability, effectiveness in meeting needs, economic efficiency, and complete accounting for all necessary investments and other actions.

7. Display and compare alternative plans. Display accounts for national economic development, regional development, environmental quality, and social well-being.

8. Reconsider or add alternatives based on analysis of acceptability, effectiveness, new information, or public policy changes.

9. Selection (if any) of the recommended plan will be made by the interested and relevant public or private groups consistent with expected impacts of the plan.

Relationship of this Paper to

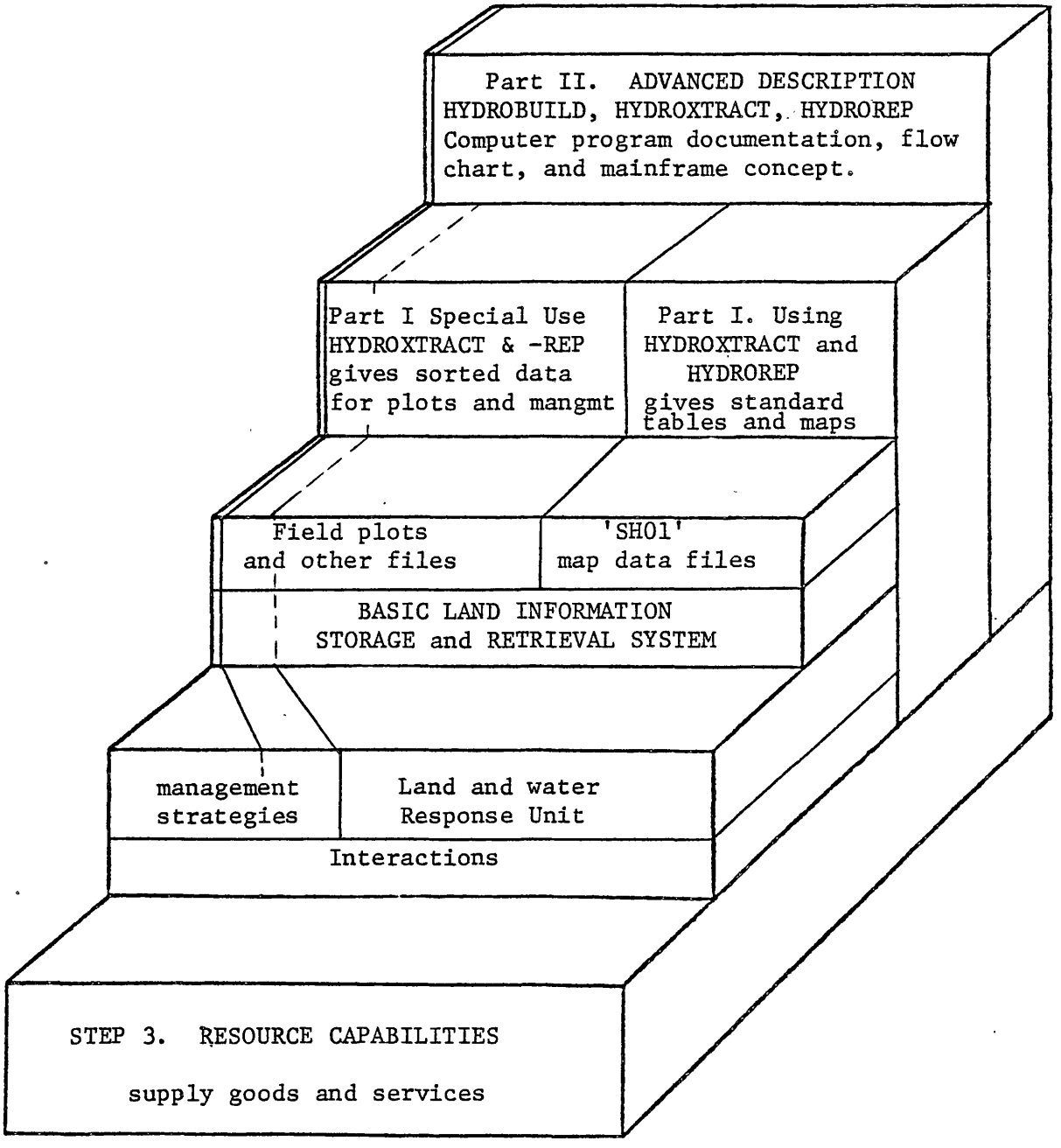
M U L T I - O B J E C T I V E P L A N N I N G,

B. Hierarchial Staircase of the Analytic Process

Step 3. Resource Capabilities

Evaluate supply of goods and services

Relationship to HYDROLOGIC EXTRACT program to field data and 'SH01' map data file.



Objectives for
Basic Land Information Storage and Retrieval System

The primary objective of this system is to be conceptually simple and understandable all the way down to the clerk level, maintain clarity of data and store survey instructions, be land-unit oriented, be capable of expansion in amount and different types of information including library data, and, most important, serve local management needs within their scope of understanding, local machinery, and manpower. The system also had to provide for yearly time sequence in long-range programs and provide an estimation of data quality.

Part I Training Objectives for Chapter 3

The objective of these instructions is to prepare a technician for the use of the HYDROIN, HYDROXTRACT, and HYDROREP computer programs.

> Given a master file index a technician will be able to prepare the computer runstream control statements, specify the parameters for the extraction process, and specify the desired table(s) and map reports. The technician will be able to do the job for batch processing or with previous remote terminal experience, do the job on demand processing.

Part II Training Objectives for Chapter 4

The objective of this portion of the report is to describe the programs in technical detail so that system maintenance and special use and application can take place economically.

> Given a deck of punch cards containing new information to be included in the master file index, the technician will be able to update the master file, prepare the index, and establish the new master in a permanent file library.
>
> For special applications the technician will be able to build and save tapes containing information extracted from other BLISTORS file, add to it, and further make special tables or maps.

Function Tree and Guide to Using Computer Programs Associated with the Basic Land Information Storage and Retrieval System

Compiled By

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Cooperative Watershed and River Basin Programs
Area Planning and Development
State and Private Forestry
Denver, Colorado
June, 1977

Introduction and Procedure

The purpose of this guide is to route a user through the Basic Land Information Storage and Retrieval System manual by way of functionally oriented questions. The user, therefore, has two ways of meeting his how-to-do-it needs:

(1) by following the Table of Contents organization
(2) by defining the function and following the key to selected paragraphs throughout the manual.

The procedure is to read the first group of criterion or questions, select the answer and move to the next numbered set. All page references are to the body of the manual.

BLISTORS - HOW TO DO IT

Number		Next
100	Basic Land Information Storage and Retrieval System	
101	Do you want to store card punched data on tape?	102
101	Do you want to retrieve data from tape files?	125
101	Do you want to store or retrieve data from non-tape files?	116
102	Familiar with type of card record	103
102	Unfamiliar with type of record	118
103	Card record built under BLISTORS guidelines	104
103	Card record not built under BLISTORS guidelines	105
104	Create a new tape file	106.1
104	Update or add to an existing tape file	106.2
105	Field cc 1-16 unique to HYDROBUILD	104
105	Field cc 1-16 not unique. to HYDROINDEX	119
106.1	BLISTORS Instructions page 37, para. 5. HYDROBUILD	107
106.2	BLISTORS Instructions page 37, para. 7. HYDROBUILD Program sorts data by cc 1-16 before creating file. Duplications of cc 1-16 are ignored.	120
107	Have batch operation or card input terminal to FCCC	108
107	Don't have card input access	107.1
107.1	Only time share terminal available. Poor choice Contact Bill Smith to work out a better way.	107.2
107.1	No computer access available: Systems Application Group Study of Needs. Contact Myron Tjarks, ADP, Denver	107.2
107.2	Work out a way to work through FS Denver ADP facilities	108
108	Data listing desired: TABLE-PRINT card says 'LIST', Page 36, para. 3.	109
108	No list desired; TABLE-PRINT card is blank, Page 36, para. 3.	110

Number		Next
109	'SH01' cards rearranged to map detail headings, Page 29-32.	110
109	Non-SH01 cards sorted cc 1-16; card image printed	110
110	Do you want to save the tape created more than 3 days?	111
110	Not save tape after 3 days	Exit
111	FILSAV program. Bill Smith, ADP, Denver	112
111	FILSAV program. Do it yourself. Use File Save Sheet	111.1
111.1	Receive weekly FILSAV status reports from Bill Smith	112
112	Long life span or high expense data; need backup	113
112	Short life span or inexpensive data; no backup (total 1 tape)	Exit
113	Retain cards at FS Warehouse plus 1 backup tape (total 2 tapes)	114
113	Discard cards but have 2 backup tapes (total 3 tapes)	114
114	Repeat HYDROBUILD or HYDROINDEX from batch operation	115
114	Use 'COPY' sequence, Page 43 if from terminal operation	115
115	Remember to FILSAV the tape(s). Cost $0.50/month/tape Tape and disc files are destroyed on the Purge Date: Watch out.	Exit
116	Physical storage and retrieval of cards	117
116	Electronic storage as mass storage. See Bill Smith. GIM	Exit
117	Mechanical card SORT, LIST, COLLATE, REPRODUCE selected data, GANGPUNCH data common to all cards, automatic KEYPUNCH; other cards to cards handling.	117.1
117	Select Tape data and retrieve as cards; HYDRORABBIT Page 47.	Exit
117.1	Denver Forest Service facilities, ADP Job Request form	Exit
117.1	Other facilities not at FS Denver, contact Systems Application Group for permission.	Exit
118	Source document known or programmer known	118.1
118	Source document unknown -- what do you know?	Exit
118.1	Not developed or not to be developed under BLISTORS Guidelines	Exit
118.1	Develop under BLISTORS Guidelines	118.2

Number		Next
118.2	Defined records in BLISTORS notebook	118.3
118.2	Card records not yet defined - see BLISTORS concepts and Guidelines. Instruction book. Chapters 1 on Orientation and Chapter 2, System Mechanics. Contact Corky Ohlander, S&PF, AP&D, Denver, 234-4323.	Exit
118.3	BLISTORS is set up as a series of appendices showing card name, format, what data, definitions and procedures.	

	NAME
Bureau of Land Management Index to North Platte land data (1962)	BLMI
Current Site Management	CA10
Aesthetics and Safety	CA11
Photograph file	PH01
Management - Plant Community - Photo Index	PH02
Geologic Formation Index	PH03
Library - subject and author	PH04
Geologic Formation Coarse Material	PH05
Sample location and observer	SA02
Surface erosion and buffers	SE01
Sedimentation	SE02
Disturbed Site Restoration	SE03
Geologic rocktype and mantle	SG01
Vegetation, soils, and other map data	SH01
Stream physical quality	SH11
Stream biological and chemical quality	SH12
Physiographic site and ecosystem	SP01
Physiographic insolation factors	SP02
Physiographic drainage patterns	SP03
Soil cover and depth	SS01
Soil water	SS02
Soil humus and roots	SS03
Soil fractions and reaction	SS04
Soil erodibility index, K	SS05
Forest vegetation, basal area	SV03
Vegetation cover percents	SV04
Timber site quality	SV05
Habitat - ground cover and downfalls	SV06
Habitat - den tree characteristics	SV07
Habitat - brush cover	SV08
North Platte linear program coefficients	NPLP
Rio Grande linear program coefficients	RGLP

119	BLISTORS program HYDROINDEX special applications contact Bill Smith, ADP, or Coryell Ohlander in Area Planning and Development, S&PF, Denver	Exit
120	HYDROBUILD on existing file, Page 36-37 for Add, Change, or Delete processes using cc 1-16 as main key.	107

BLISTORS Retrieval System Mechanics

Number		Next
125	Familiar with Chap 3, BLISTORS instructions	126
125	Familiar with Chap 4, BLISTORS instructions	140
125	Unfamiliar with Retrieval System mechanics, Read Chap 3	Exit
126	Have Tape Number and name of map file	127
126	Don't have Tape Number. Contact Bill Smith, ADP	127
127	Remote terminal operation	128
127	Batch operation process at FS Denver facility	129
128	To run as demand processing (fast return)	128.1
128	To run as batch processing (includes priority letter)	129
128.1	Figure out the amount of printed output - do you want it?	128.2
128.1	Don't want amount of output or demand time expense	129
128.2	Instructions for time share, Page 9 to 10 Good luck	130
129	Instructions for batch process, Page 9 to 10	130
130	Extract non-map data, field data, Multi-Accomplishment Report, library information	139
130	Extract map data (SH01 appendix). Statements to be included, Page 16	130.1
130	Extract map data (SH01 appendix). Statements to be excluded, Page 16	130.1
130.1	Is sequence of line numbers in the file important? Page 10 para. 3ff.	130.2
130.1	If line numbers in file not important, make line range parameter 1-90000	130.3
130.2	Check Table 1 HYDROBUILD list or line index map in Table 25 for line numbers, page 36, para.3. Page 25	130.3
130.3	Is National Forest code or Outside code "ØT" important? SH01 appendix	130.4
130.3	If National Forest code unimportant, leave card blank, Page 11	130.4
130.4	Is County code important? Appendix SH01 map file, Page 11	130.5
130.4	Unimportant County code, leave card blank	130.5

Number		Next
130.5	Is Forest Service watershed code(s) important? SH01 appendix, Page 11	130.6
130.5	Unimportant Forest Service watershed code(s), leave card blank	130.6
130.6	Is Soil Conservation Service watershed code(s) important? SH01 appendix, Page 12	130.7
130.6	Unimportant Soil Conservation Service watershed codes, leave card blank, Page 12	130.7
130.7	Is administrative unit code(s) important? SH01 appendix, Page 12	130.8
130.7	Unimportant administrative unit(s); leave card blank, Page 12	130.8
130.8	Is legal location important? Give one location, Page 12	130.9
130.8	Unimportant legal location, give blank card, Page 12	130.9
130.9	Card Column identification; this is a catch all; up to 200 character sets, Page 13	131
130.9	Card Column identification, unimportant; leave blank	131
131	Be aware of tremendous power in mixing column 'includes' and 'excludes', Page 13-14	131.1
131.1	Getting single or multiple reports, Page 18	132

Reports Available from BLISTORS, Page 21-26

Number		Next
132	Define report(s) - detailed map data in sorted tabulations (14 possibilities), Page 22-24	133
132	Define report(s) - summarized map data in sorted tabulations, Page 26	134
132	Define map display - 40 acre and 160 acre sample size	135
132	Special data handling not applied to SH01 map data	136
133	SH01 map data sorted into major groups, detail listings with acres totaled for items, classes, or categories.	
	1. Ownership	133.1
	2. Vegetation - Ecosystem and canopy detail	133.2
	3. Geology - and geology and soils combination	133.3
	4. Ecosystem - ignores canopy grouping	133.4
	5. River basin and National Forest boundary	133.5
	6. Transportation access	133.6
	7. Administrative units	133.7
	8. Legal location	133.8
133.1	Ownership major grouping then sorted sequentially:	
	Vegetation, Slope Totals O,V,S Classes: Slope 0-40, 41-70, 71+%	Table 2 137
	Ecosystem, Slope, Aspect, Geology-Soils Totals O,E,S,A,G-S Classes: Slope 0-40, 41+% Aspect 0-156, 157-246, 247+	Table 7 137
	Vegetation, Geology, Soils, Precip, Aspect, Slope Totals O,V,G,S,A,S Classes: Slope 0-40%, 41-60%, 61+% Aspect 0-45, 46-135, 136-225, 226-315, 316+	Table 14 137
133.2	Vegetation major grouping then sorted sequentially:	
	Slope, Aspect Totals V,S,A Classes: Slope 0-40, 41-70, 71+% Aspect 0-66, 67-156, 157-246, 247+	Table 3 137
	Slope, Geology, Aspect Totals in Vege, Slope, Asp Classes: Slope 0-40, 41-70, 71+% Aspect 0-66, 67-156, 157-246, 247+	Table 5 137
	Geology, Slope, Aspect Totals in Vege, Slope, Asp Classes: Slope 0-40, 41-70, 71+% Aspect 0-66, 67-156, 157-246, 247+	Table 6 137

Number		Next
133.3	Geology and Geology-Soils major grouping then sorted sequentially:	
	Vegetation Totals in Vegetation	Table 4 137
	Geology-Soils, Slope, Aspect Totals G-S,S,A Classes: Slope 0-70, 71-% Aspect 0-156, 157-246, 247+	Table 10 137
133.4	Ecosystem major grouping then sorted sequentially:	
	Elevation, Slope, Aspect, Ownership Totals E,S,A,O Classes: Slope 0-40, 41+% Aspect 0-156, 157-246, 247+	Table 8 137
	Geology-Soils, Slope, Aspect Totals E,G-S,S,A Classes: Slope 0-40, 41+% Aspect 0-156, 157-246, 247+	Table 9 137
133.5	River basin and National Forest major grouping then sorted sequentially:	
	AD Unit, Ownership, Ecosystem, Slope, Elevation, Aspect Totals in Owner, Ecosystem, Slope, Aspect Classes: Slope 0-40, 41+% Aspect 0-156, 157-246, 247+	Table 11 137
	Combinations of slope, aspect, and elevation are interpreted for management groupings and tabulated as part of ecosystem.	
133.6	Transportation access major group then sorted sequentially. Before selecting this table be sure the data is there. Very little data of this kind has been collected.	
	Precipitation, Administrative Unit, Vegetation, Soils Totals V, Soils	Table 12 137
133.7	Administrative unit major group then sorted sequentially:	
	Vegetation, Slope, Aspect Totals V,S,A, Classes: Slope 0-40%, 41-60%, 61+% Aspect 0-45, 46-135, 136-225, 226-315, 316+	Table 13 137
133.8	Legal location sort. No totals calculated	Table 1 137
134	SH01 map data sorted into major groups and sequential groups. Data printed in summarized format where totals for acres exist.	
	Summary - Ownership, Vegetation, Precipitation and Soils. Summary Totals in Ownership, Vegetation and Soils.	Table 20 137

Number		Next
	Summary - Land Resource Area (cc 43), Ownership, General Soils (cc 73), and Vegetation Summary Totals in Ownership and Vegetation.	Table 21 137
135	These take the SH01 map file and prepares a map. Use the extract program to get the characteristics you want mapped.	
	Ecosystem and interpretation of slope, aspect, and elevation criteria as developed in Table 11. 40 acre print cells. 160 acre cells are converted into 40 acre print cells.	Table 18 137
	Ecosystem and geology are printed in 40 acre print cells. 160 acre cells are converted into 40 acre print cells.	Table 19 137
	Line number map shows the file location - line range extract criteria.	Table 25 137
	Ecosystem and canopy are printed in 40 acre print cells with ecosystem on top and canopy on the bottom.	Table 26 137
136	Special data tables - does not apply to the map file card SH01. Includes field data cards, index cards, interpretation cards and Multiple Accomplishment Report data.	
	Master file sorted by cc 1-16, card type, and data level.	Table 01 137
	Master file is sorted cc 17-24, then 52-56, by BLISTORS card type. Listed in table format.	Table 15 137
	Master file is sorted cc 60-66; then 17-24 by BLISTORS card type. Listed in table format.	Table 16 137
	Master file is sorted cc 36-48, then 17-24 by BLISTORS card type. Listed in table format.	Table 17 137
	Master file is sorted by card type (cc 77-80) data level (cc 76), and location (cc 1-16).	Table 22 137
	Multiple Accomplishment Report data - by project.	Table 23 137
	Multiple Accomplishment Report data - activity and project.	Table 24 137
137	Need multiple tables from the same extract file Last table card make '00'	132 138

Number		Next
138	No need for another extract on the tape. Need to rewind tape for another extract. After last '00' report card follow with '@XQT HYDROIN', then return to Page 10 on Extract Criteria Statements, '@XQT HYDROXTRACT' '@XQT HYDROREP' (Page 18) 10 New area name 21 New area name 00 The '@XQT HYDROIN' to '00' sequence can be repeated indefinitely.	Exit Exit
139	Non-map data extracts can have any set of criteria used but will mainly be: a) data file sequence or range of line numbers, Page 10; b) legal location, Page 12 c) most useful extracting data by columns identification, Page 13 1) Library index set 77-80 = 'PH04' Table 01 --- lists by numerical order in library Table 15 --- lists by subject or keyword Table 16 --- lists by author Table 17 lists by (cc 36-48) special fields	 136 136 136

Table of Contents

Chapter 4 Advanced Description and Use of Computer Package (cont)

SECTION II: BASIC LAND INFORMATION STORAGE AND RETRIEVAL SYSTEM

CHAPTER 1

O R I E N T A T I O N

This system is designed to provide a way for field people to store and retrieve information through a common data file system. Most of their needs are simple and usually related to retrieving all the information pertinent to a given area or particular kind of survey. They also need to have a system that they control and that is within the scope of their understanding, machinery, and manpower. There should be no fancy programming requirements at this level of storage and retrieval need, allowing the operations to be simple.

The ultimate intent would be to provide a field level information bank from which reports could be generated with a minimum of impact at the field level.

The primary objectives for this system design is to be conceptually simple and understandable, maintain clarity of data and store survey instructions, be land unit oriented, be capable of expansion in amount and different types of information including library data, and most important, serve the needs of small field subunits. In addition, the system has to lend itself to creation of working papers at the project level and then to multiple stages or levels of input and output by way of - ultimately - data phone communication.

The system must be expandable to cover data entries in time sequence for long-range programs. It has to also be able to handle new types of data from new or developing resource concepts. As of now there is a general lack of experience on computer machines small enough to be installed at the field level. As a result, the lack of computational ability inhibits the collection of what is considered marginal data. But it is only marginal in the sense that even though researchers have developed relationships for use in gaining other ecological parameters, the usual hand computation takes too long or is beyond the scope of the commercially defined land use job. But as time goes on, the situation will change and a storage and retrieval system must be flexible to accommodate the changes without starting over.

The following system is offered as a solution to the preceding list of objectives and offers guides in the use of it.

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Black Hills National Forest
Custer, South Dakota
May 5, 1969

CHAPTER 2

SYSTEM MECHANICS

FORMAT RULES

The system lays out a format for each data card that includes a unique card index, the year of data survey or remark, a level of data approximation and a primary area address. Since there are set rules governing the introduction of these data items, it means that information can be sorted by these groups and handled rapidly in a computer operation. A user could define a particular land area and ask for all the data pertaining to it regardless of who collected it. Years and levels of approximation can be specified to prevent ruining high quality data with poorer or out-of-date estimates. Yearly accumulations can be separated out for annual summary reports or a trend analysis generated from the time sequence.

As mentioned, set rules define the use of card columns for primary area identification, year, data approximations, and unique card identification. It is intended that a user either use the columns as spelled out or leave them blank. In this way the cards would still be compatible for storage and retrieval and yet not confound existing data.

Rule 1. Cards will be uniquely identified by following card column definitions in cc 74-80.

cc 74 - 75 Year of report. Code 1967 as 67.

cc 76 - Code levels of approximation as

- 0 - Not applicable
- 1 - Title definitions including instructions or procedures.
- 2 - Header or card title
- 3 - Rule of thumb generalizations
- 4 - Generalized map-photo and office estimates
- 5 - Detailed map-photo interpretation
- 6 - Cursory field check or examination without defined plot data.
- 7 - Non-statistical survey with plot data
- 8 - Statistical survey of defined limits
- 9 - Total measurements survey of population

cc 77 - 80 Unique card identification can be any combination of numbers or letters so long as it has not been used before. Card column 77 has been used to code the type of report being made and cc 78 the subject field with cc 79 and 80 just numbering a sequence of similar cards. Some possible combinations are listed below:

	cc 77 Type of Report	cc 78 Subject
A	Accomplishment Report	Administrative
B	Boundary	Basin
C	Comments or narrative	Climate
D	Damage	Demography
E	Evaluation of Management	Erosion
F		
G		Geology
H		Hydrology
I	Inspection	
J		
K		
L		Livestock
M		
N	Needs in Resource or Management	
O	Objectives Statement	Occupancy
P	Planning Statement	Physiography
Q		Streams & Water Resource
R	River	Recreation
S	Survey	Soil
T	Trespass	Transportation
U		
V	Valuation	Vegetation
W		Wildlife
X	Xperimental or pilot project	
Y		
Z		

For example, in a current hydrologic survey we are using 10 cards identified as SP01, SP02, SP03, SG01, SS01, SS02, SS03, SV03, SV04, and SE01.

After the initial question of where to put new data, the card and column codes are to be included in an index with the data item listed in alphabetical order for subsequent use. If the existing data card(s) is not satisfactory, then the user need only design his own. He has the responsibility of following the rules of the game and updating the index, however.

Rule 2: Areas will be identified by the common based legal system described by meridian, township, range, and section. Areas within sections can be further refined as the user wishes. Since the process involves the largest unit first, it is suggested that sequential subdivisions follow the same large-to-small order.

cc 1	Principal meridian with identified baseline from coast and geodetic survey. A "6" identifies the 6th PM; a "B", the Black Hills meridian; and an "N", the New Mexico meridian.
cc 2 - 4	Township 001 to 999
cc 5	Use "5" for "1/2" units; normally zero.
cc 6	Township Direction "N" or "S"
cc 7 - 9	Range number 001 to 999
cc 10	Use "5" for "1/2" range units; normally zero
cc 11	Range Direction "E" or "W"
cc 12 - 13	Sections coded 01 to 36
cc 14 - 16	Area number used for refining area identification within a section. This three-place alphanumeric code allows an unlimited number of separate identifications and is suitable for diverse functional codes.

The fact that these units will tend to be small has the advantage for us to be quite specific in our detail and avoid meaningless generalizations. The smallness of area and the mass of detail work can be offset if the sample or map unit has been predetermined and a computer used to handle the data. For example, a point sample method could be used as in Method 1 or units defined by elevation contours and aspects as in Method 2. A third method would be to preprint suitable units on our 3-color planimetric maps based on inherent characteristics that won't change: geology, soils, elevation, slope, and aspect.

Some possible methods are as follows:

Method 1. Quarter/Quarter codes using ABCD where A is NE, B is NW, C is SW, and D is SE. The NE-1/4 of the SE-1/4 of the NW-1/4 codes BDA using largest unit first. This process allows data to be tabulated at a level commensurate with the quality of data and the needs of management. There is no system need for the data points to be the same size. We could sample AAA, AAB, AAC, and AAD at 10 acres; AB, AC, and AD at 40 acres; B, C, and D at 160 acres in the same section and same survey. This method lends itself easily to acre computations and line printer maps.

Method 2. Aspect/Elevation land units based on hundreds of feet in elevation with N, E, W, S codes as aspects. Use the first place code from 0 to 9, T, U, V, X, Y, and Z for thousands of feet. For over 9 thousand, use letters t = 10, U = 11, V = 12, X = 13, Y = 14, Z = 15.

The second place code identifies hundreds of feet as 0 to 9. The data entry will normally be taken from topographic maps that emphasize every fifth elevation line. A data entry of this elevation can be used to identify the area above it to the next emphasized line. An alternative would be to use the midpoint elevation.

The third place code identifies aspect or general orientation. Use N for north aspects, S for south aspects, E for east aspects, and W for west aspects. In cases where aspects are indeterminate as on ridges, plateau and bottoms, use I for indeterminate or R for ridges, P for plateau, or B for bottom.

An alternative would be to use letters A to Z in the first column for a particular elevation aspect unit and leave the next 2 columns open for finer subdivision of the elevation unit.

The prime advantage of this method of unit description is that the units have already been mapped on normal topographic maps and is therefore already available to land managers, with little or no trouble. There is no need to constantly redraw units. A second reason is that elevation and aspect with steepness of slope can be used to define the energy and moisture input to the ecological system.

Method 3. Another method available is just simply marking out a section according to functional needs as elevation units, vegetative types, soil depths, etc. Although these units have not been handled in any other way except by drawn maps, the coordinates of the boundaries could be extracted and stored on a card for each unit. This approach allows freedom to the individual map maker but has the disadvantage of not being widely distributed unless the map maker does it himself or gets the units preprinted on functionally standard maps.

The best system of mapping for a long-term period would be to map units with homogeneous inherent characteristics that would not change with land use: geology, soils, elevation, aspect, and steepness of slope. These base units could be identified by a single number or letter (since there would probably not be more than 35 main topographic units per section), leaving 2 columns for further refinement in vegetation, soil phases, and cultural or economic development details.

GUIDELINES
(May 5, 1969)

Many different uses and combinations are possible within the framework of this system, but the objective is to provide information to many different people at different times. Therefore, keep it simple and obvious. Guidelines for maintaining clarity in data stored are offered:

1. Technical jargon, non-essential codes, and arbitrary categories or groupings would be eliminated when it is within the power of the user to do so. The groups can be generated from specific measurements or finite data, but the reverse is not true and the program designer generally lacks the ability to project future uses of the data. A predetermined category for data accumulation lessens its usefulness to other users and will result in a complete waste of time when the category is redefined or scraped. Whereas the uses of good data tend to increase as new applications are found.

2. Input data including data identification will be in English or reasonable abbreviations. Clarity and intelligibility will not be sacrificed to save card columns. Be sure to include a set of instructions or definitions concerning your data. These can be added to your card deck with a "1" in the level of data approximation, cc 76.

3. Data entries should represent measurements of the environment with regard to particular parameters. Avoid ratings of "high," "medium," or "low" as a data entry. Such information is interpretation and can be machine programmed if a suitable standard has been defined.

4. Since there are over 1-1/2 million combinations for unique card identification in cc 77-80, overlapping types of data for one card can be easily avoided. For this system it must be avoided.

5. To store information that does not relate specifically to a land unit, leave cc 1-16 blank in order to not confound existing land unit designations. If a secondary or summary unit has been used, such as a timber compartment or range allotment, the number can start in cc 17 leaving 1 to 16 blank.

   Library programs or surveys involving narrative statements also must not confound land area designation. It has been suggested that a cc-1 blank or "X" or "L" would allow the machine to separate those fictitious land areas of "X" or "L" out of the real land area data, and thus let data collectors use 2 to 16 for other data. Yes, it is possible, but the column use would be neither simple nor obvious and could result in information loss from user confusion. Stay away from this clutter if at all possible.

CHAPTER 3

DATA EXTRACTION AND REPORTS

(How to do it)

Background

This package of computer programs is designed to aid in meeting the Region's River Basin program responsibilities in land use planning. The hydrologic files are part of a larger master data storage and retrieval system known as Basic Land Information Storage and Retrieval System.

Parent System 'BLISTORS'

The user control information presented here can be used to manipulate any of these master files. However, this write-up is specifically oriented to the "SH01" card that contains information on vegetation, geology or soils, slope, aspect, elevation, precipitation, and ownership by county, Forest, administrative unit, Forest Service watershed, Soil Conservation Service watershed, and legal location.

'SH01' map data computer files

The primary purpose of this program is to generate acreage totals for particular classes of land.

compute acres

General Description

This package takes any hydrologic master file and extracts data according to a set of parameters. These parameters are given by the user. The areas on which data can be extracted are:

1) Position in the master file (line number)
2) Forest
3) County
4) Forest Service watershed
5) Soil Conservation Service watershed
6) Administrative unit
7) Legal location
8) SH01 column (any single or multiple column)

area extraction criteria

After the data has been extracted, standard tables can be run on it.

standard tables

Page

Extracting the Data Wanted

Suppose we had a file with the following lines in it:

APPLES
PEARS
PEACHES

PLUMS
ORANGES
GRAPEFRUIT
AVOCADOS
BANANAS
CHERRIES

Let's say we were to do an inclusive extract on all lines beginning with a "P". The extracted file would be:

INCLUDED area extract of file

PEARS
PEACHES
PLUMS

As you see, all lines that have a "P" in the first column have been extracted. In other words, all lines beginning with a "P" have been included in the extract. Now let's say we were to do an exclusive extract on all lines beginning with a "P". The extracted file would be:

APPLES
ORANGES
GRAPEFRUIT
AVOCADOS
BANANAS
CHERRIES

EXCLUDED area extract of file

Note that none of the lines extracted have a "P" in the first column. In other words, all line beginning with a "P" in the first column have been excluded from the extract.

Except for legal location, this package can do an inclusive or exclusive extract on any of the categories listed in the first section.

What You Need to Know

Before punching the batch cards (or log on to timeshare), you need to know:

need to know first

1) The tape number of the master file.
2) About how many pieces of data will be extracted.
3) Which tables you want to run.
4) On which categories the data is to be extracted.
5) The range of lines in the master file that contain the data you want (This can be a very rough approximation).

Starting the Package

first card

RUN

The RUN statement carries the following control information: @RUN, priority letter/RN run-id, account #, qualifier , time, number of pages, number of print lines (no period).

If you will be extracting no more than about 2000 lines of data, and will be doing no more than 5 tables, use the following RUN statement:

YOURACCOUNT# is special get one from the friendly folks at ADP

@RUN,P/RN RUN-ID,YOURACCOUNT#,QUALIFIER,10,500/11000
(in timeshare, leave off the ',P/RN').

The RUN-ID, YOURACCOUNT#, and QUALIFIER are supplied by you. All three of these fields must not have any special characters in them. The RUN-ID is usually in the form of R02XXX where XXX are three letters or numbers of your choosing. Check with the Region's ADP section for the account # you should use. The QUALIFIER is some name dreamed up for identification of the job (this is usually the same for all the jobs you do). The qualifier must not have spaces in it.

If all your extracts fall within the sample RUN statement, please do not read the following section (you'll only get confused with information you don't need).

figuring pages and lines for

RUN

Take the number of lines you expect to extract throughout the entire run, and multiply it by the total number of tables to be run. This gives the number (plus about 10% for slop) after the second slash in the above RUN statement (replacing the 11000). Then take the number and divide it by 20. This gives the number of pages to be printed in the run. Again, add 10% for slop, and put it in the place of the 500 in the above RUN statement. Finally, put a 20 in place of the 10 in the above RUN statement. For example, say about 5000 lines are to be extracted, with only 5 tables to be run on that data. The number of lines to be sorted is 5*5000 = 25000 + 10% = 27500. The number of pages is 27500 / 20 = 1380 + 10% = 1518. So, your Run statement would like:

@RUN,P/RN R02XXX,YOURACCOUNT#,QUALIFIER,20,1518/27500

in timeshare: @RUN R02XXX,YOURACCOUNT#,QUALIFIER, 20,1518/27500

For most runs, 20 minutes of computer time (the underlined number) is more than sufficient.

After the RUN card, the following statements must be made, regardless of whether the job is batch or time-share:

```
@USE INN, master file name
@ASG,T INN.,U9V,FXXXXX  (where XXXXX = tape number)
@ADD R2PROG*R2PROG.HYDROSTART
@ADD R2PROG*R2PROG.HYDROIN
```

next 4 magic cards

Extract Criteria Statements

The machine is now ready for the criteria. (Note: the following description is for a batch run, but the statements are practically the same for timeshare jobs. Timeshare users should read the following section, and then read TIMESHARE OPERATION.) The criteria statements (or cards for batch) are as follows:

1) Line Range card. (At least 1 required)

line range cards

This card controls which lines in the master file the extract will look at. If the rest of the criteria cards are blank, the machine will extract those lines from the master file. The card looks like:

```
xxxxxx-xxxxxx,xxxxxx-xxxxxx,.  .  .,xxxxxx
```

where the x's are the line numbers, no more than 6 digits long, and not less than 1 digit long. For example, say lines 1 through 3000 and lines 7000 through 19000 (inclusive) are to be looked at. The parameter card would look like:

```
1-3000,7000-19000
```

Each number must be equal to or larger than the number before it. The following cards would not be accepted:

```
1-20,15-25,35-40,50-60    (15 is less then the 20 before it)
1-400,500-450,600-700     (450 is less than the 500 before it)
500-600,750-900,200-300   (200 is less than the 900 before it)
```

The program will handle up to 200 of these ranges in any given extract.

The machine will always assume that another line range card will follow until it reads a blank card. If you have more line ranges than will fit on one card, put

last card blank

as many of the ranges as will fit on one card, and then continue the ranges on the next card. This continuation can go on ad nauseum until either all your line ranges have been given or 200 ranges have been given. For example:

...,1510-1765
...,1980-1995
...,37000-41015
blank card

Do not end a card with a comma or other punctuation, the computer will try to read the space as line numbers and you will be surprised.

2) Forest card (1 required)

This card gives the FOREST codes the extract is to use and looks like:

1 forest card

xx,xx,xx,xx,. . .,xx (no ending punctuation)

Each code must be 2 characters long. If the machine is not to extract on FOREST data, give a blank card. Only one FOREST card will be accepted. Four example cards are:

AR,OT
AD
RG,AR,OT,AD,SJ,MB
(blank card)

3) County card (1 required)

This card gives the county codes the extract is to use and looks like:

1 county card

xx,xx,xx, . . .,xx (no ending punctuation)

Each code must be 2 characters long. Give a blank card if county is not needed. Only one COUNTY card will be accepted.

4) Forest Service watershed (1 required)

1 forest service watershed card

This card gives the Forest Service watershed codes the extract is to use. Three example cards are:

21,22,23,24,25 (no ending punctuation)

52,16,73
(blank card)

Only one F. S. watershed card will be accepted.

5) Soil Conservation watershed (1 required)

This card gives the Soil Conservation Service watershed codes the extract is to use. Three example cards are:

A1,22,GR (no ending punctuation)
OK
(blank card)

1 soil conservation service watershed card

Only one S. C. S. watershed card is accepted.

6) Administrative unit (1 required)

This card specifies the administrative units to be extracted. The card looks like:

xxxxxx,xxxxxx,. . .,xxxxxx

1 administrative unit card

where the x's are letters, numbers, or spaces. (Note: if you want to extract just those units that are all spaces, include a comma after the first 6 spaces.) Each code MUST be 6 places long. Giving a blank card tells the machine it is not to extract according to the ad unit. Only one ad. unit card is accepted. Five example cards are:

A12345,MPLTNF (no ending punctuation)
CVPC12
,
bbbARC,B112BB ("b" = blank)
(blank card)

7) Legal location (1 required)

This card gives a legal location to be extracted. Only one legal location can be specified for any extract. This card looks like:

xxxxxxxxxxxxxxxx (16 x's)

1 legal location card

When a legal location is printed on the master file listing, it looks like:

N074.0N001.0E 36CDA

This is not the way it is put on the card; you take out the periods and the space, thus:

N0740N0010E36CDA

Remember that the spaces in the Area part of the location are to be left in:

N0630N0020E27Cbb ("b" - blank)

This code must be complete. Leaving off any part will not make the machine pick up data that matches just the part you give it.

Give a blank card if the machine is not to extract on legal location.

8) "SH01" Column (At least 1 card required)

This card allows you to extract data according to a character in a particular column in the line, or according to a set of characters in a set of columns. (see "SH01" format). The card looks like:

xx=c&xx=c&...&xx=c,xx=c&xx=c (no ending punctuation)

Where x's refer to the two digit column number (01 thru 80) and the c is the character in that column. The ampersands (&, punch '0-2-8') are used to "tie" conditions together, so that all cases "tied together" must hold before the line is extracted. An example using this idea would be: suppose we wanted to extract a line only if it had the characters "LP8W" in columns 17-20. The following card would do the trick:

17=L&18=P&19=8&20=W

The comma (,) is used to "separate" conditions that are not to affect one another, i.e., the line is to be extracted if either condition holds. For example, suppose we wanted to extract a line if it had the characters "LP9M" in columns 17-20 or if it had the characters "M8W" in columns 17-19. The following card would work:

17=L&18=P&19=9&20=M,17=M&18=8&19=W

Note that you may test for just one character in one column by simply not tying the condition to any other conditions. For example, suppose we wanted to extract a line if it had the characters "045" in columns 54-56 or if it had the character "P" in column 34 or if it had the character "M" in column 43 or if it had the characters "10" in columns 52-53. The following card would work:

54=0&55=4&56=5,34=P,43=M,52=1&53=0

Up to 26 conditions can be "tied" together before they must be "separated" by a comma. Up to 200 "tied" sets may be given in a run.

More than one card may be given in one run; however, a "tied set" can not be continued on the next card.

Three example cards are:

43=A,43=C&44=D&45=E,01=0&02=6
17=1&18=L&19=P,17=L,28=9&30=0
(blank card)
The machine will read SH01 column cards until it reaches a blank card. If the machine is not to extract on this category, give just a blank card.

Title: Hydro-Resource map survey origination: 1974
North Platte, 1974 Rio Grande, 1972 Arkansas, 1973
Arapaho National Forest, 1970 Wind Bighorn

Format:

Card Columns	Description
1-16	Legal location
1-11	Township & Range
1-6	Township
7-11	Range
12-13	Section
14-16	Area
14-16	Area = 10 if full
14-15	Area = 40 if full
14	Area = 160 if full
14-16	Area = 640 if blank
17-24	Vegetation
17-20	Ecosystem
21-24	Canopy character
25	Basin
26-27	Forest
28-29	County
30-31	Watershed, Forest Service
32-33	Watershed, Soil Cons. Serv.
34	Ownership
35	Blank
36-39	Access
40-42	Annual Precip.
43-48	Administrative unit
43	SCS Land Resource Area
49-59	Topographic features
49-51	Land form
52-53	Slope %
54-56	Aspect azimuth
57-59	Elevation 100'
60	Blank

Card Columns	Description
61-66	Geology formation
67-69	Hydrologic type
70-73	Soils
73	General Soils, SCS
74-75	year of survey
76	Data quality
77-80	Card type (SH01)

Comments may be placed on any parameter card, so long as they are preceded by three spaces. If the card is a blank card, the comment should not start before column 25.

Excluding and Including Extracts

All the criteria statements above tell the machine that you want those items to be included in the extract. To tell the machine that a particular criteria is to be excluded, put an asterisk (*) in the first column of the card. This tells the machine that all items in that category are to be excluded. Even though inclusion or exclusion applies to the whole category, it need not apply to the entire extract. For instance, say you wanted data from lines 1000 to 2000, but you didn't want data from the Medicine Bow forest. You could then do an including extract on the line-range category (with 1000-2000 as the range) and do an excluding extract on the FOREST category (with MB as the forest code). The deck would be:

how to EXCLUDE area criteria

```
1000-2000
(blank card)
*MB
(6 blank cards)
```

The excluded categories take priority over the included categories. In other words, data matching any of the excluding criteria will be rejected before it is compared to the including criteria.

Exclusion on the legal location is not allowed. Since only one location may be specified, it's ridiculous to exclude one line from the extract.

This applies to the SHØ1 column card in an expanded way. The asterick can be applied in this ctaegory to any "tied" set of conditions. This is done by placing the asterick in front of the "tied" set to be excluded. The exclusion will hold until a comma (separator) or the end of the card (which ever comes first). For instance:

```
17=L&18=P&19=8,*17=M&18=8&19=W,17=M
```

The above line would extract all lines that had "LP8" in columns 17-19 and all lines that had an "M" in column 17 except for those lines that had an "M8W" in columns 17-19.

This method of including and excluding is very different from the method used by the other categories. Note that separate items within a "tied" set may not be excluded separately.

Also note that a "single item" condition may be excluded.

```
17=L&18=P&19=8,*27=M,17=M&18=8
```

The parameters are now all in. The next card must be:

```
@ADD R2PROG*R2PROG.HYDROXTRACT                    next
                                                  magic
                                                  card
```

Your extracted data is now on temporary file OUTT. (Note: if at this point on your print-out you find 'NO DATA FOUND MATCHING CRITERIA', check your criteria cards to insure they are correct. Also check to be sure that the master file tape number is correct. If they are, there is no data matching your parameters in the line ranges you gave.) On your print-out at this point should be a line telling how many lines were read and how many lines were extracted. If you would like for this data to be saved permanently, copy file OUTT to a permanent file. (See ADVANCED DESCRIPTION)

Getting Reports

For most cases, just tables are wanted on the extracted data. In this case, you would put:

getting standard tables

```
@ADD R2PROG*R2PROG.HYDROREP
```

after which you would put the cards for which tables are to be run. These cards look like:

page

```
xxccccccccc. . .
```

where xx is the number of the table to be run and ccc . . . is the table area (any name that you dream up will do). See the listing for tables that are currently available. The last table card must have 00 as the table number.

last card 00

Timeshare Operation

For the most part, the entries are the same for timeshare operation as for batch. These commands are:

timeshare statements

```
@RUN RUN-ID,YOURACCOUNT#,QUALIFIER,10,500/11000
@USE INN,master file name
@ASG,T INN.,U9V,FXXXXX  (where XXXXX = tape number)
@ADD R2PROG*R2PROG.HYDROSTART
@ADD R2PROG*R2PROG.HYDROIN
```

The machine will now start asking for the extract criteria. To help you, the machine will tell you which criteria it is looking for. For line ranges, if the entry is accepted, the machine will respond with a line asking for more line ranges. If the entry is not accepted, the machine will give an

error message and then ask for a line-range. In this case, re-enter the last entry. If you are done, enter a carriage return. The machine will now ask for the other criteria one at a time. Enter the appropriate response. If you don't wish to use any particular category, just push carriage return for that category. If the machine asks again for the same category, re-enter the last line. When you get to the SH01 category, the machine will keep asking for input till it gets just a carriage return. If you don't want anything in this category, hit a carriage return. If you are done, hit a carriage return. If the machine gives an error message, re-enter the last line.

timeshare extraction criteria

error message

When you are finished giving parameters, the machine will return with:

PARAMETERS CORRECT, THANK YOU

You should now enter:

@ADD R2PROG*R2PROG.HYDROXTRACT

The machine will then print out how many records of data it read, and how many records it extracted. The extracted data is now sitting on temporary file OUTT.

Since the machine has told you how many records it extracted, you can decide whether you want the tables printed at your terminal, or at an off-site printer. If you want the tables to come out on your terminal, enter:

@ADD R2PROG*R2PROG.HYDROREP

and then enter which tables you want printed. You do this by typing:

getting standard tables

xxccccccccccc. . .

where xx is the table number and the c's are the table name. Each table will be printed after each entry you give. Enter 00 for the table number if you are done.

last entry 00

If you don't want the tables printed on your terminal, enter:

```
@ADD R2PROG*R2PROG.HYDROTIM/REP                          print
@MSG PLEASE GIVE TO (YOUR NAME)                          report
@MSG YOUR ADDRESS                                        somewhere
@MSG YOUR CITY, STATE ZIP                                 else
@ADD R2PROG*R2PROG.HYDROREP
     tables you want printed
```

If, at this point, you are curious to look at portions of the tables, enter:

```
@BRKPT PRINT$
@ED,R C.
```

and look at it using the text editor. (NOTE: presumes a knowledge of the text editor by the user.) — use of text editor

Finally, you should enter:

```
@ADD R2PROG*R2PROG.HYDROTIM/OUT
@FIN
```

If you would like for your printout to come out somewhere other than the Regional office in Denver, either talk to ADP at the Denver office or see advanced description. Remember, if your name and address are given using the @MSG's above, the printout will be mailed to you.

REPORTS AVAILABLE

There are four basic types of reports available:

1. Straight Retrieval.
   These reports print a detailed list of data, record by record. The output shows the data or card image just as it exists on the computer tape file. Individual records are sorted or alphabetized by selected data fields before printing. Numerous sorts are available and can be selected by matching up the Table(s) numbers that meet your needs. Tables 1, 15, 16, 17, 22, 23, 24, are of this kind.

2. Detailed Map Tabulation Report.
   This type of report shows a record by record list of map data (SH01 card type) printed in tabular format. The format is standard for several tables with the differences occuring in the way the data fields are alphabetized or the acres accounted for. Tables 2 thru 14 are of this kind.

   Accumulated acre totals for vegetation, ownership, slope classes, aspect classes, and geology-soil complexes are printed in the standard format table. The combinations of groups and subgroups are determined by the Table(s) you select.

   The acre totals are printed at the time there is a change in the specific field. For example, 5000 acres of 'M' ownership gets printed when the next ownership record is a 'N'. At this point, the account is reset to zero and the computer now keeps track of 'N' acres. The printing of any acre total is independent of any other acre total.

3. Summarized Map Tabulation Report.
   This report is made up the same way as the detailed report described above in #2 except that only the lines containing acre totals are printed. This shortens the amount of output 10 to 20 times and is useful when detail records are not needed. Tables 20, 21, 27, 28, 29, 30, are of this type.

4. Map Format Display - Township and Range Base.
   While this is not really a map, the selected data fields are shown in their appropriate legal locations within the Township. This stylized map uses 16 print cells for each section. Each cell is 4 characters long by 2 lines deep and accounts for data constructed on 40 acre size samples. The program will also convert 160 acre samples into cells for printing. Tables 18, 19, 25, 26, are of this type.

Description of Tables Available

Table	Title and Data Fields Sorted
1.	'Detail by Location, Cardtype, and Data Quality.' Alphabetic by location, then by cardtype within a location, then by data quality within a cardtype. See Chapter 2 for the format rules, data quality levels, and concepts behind the unique cardtype identification.
2.	'Ownership, Vegetation, and Slope, Detail' 'Table Characteristics: Slope classes 0-40, 41-70, & 71+%' Alphabetic by ownership, then by vegetation, and then by slope. Acres are accumulated for ownership, vegetation, and slopes.
3.	'Vegetation, Slope, Aspect - Detail' 'Table Characteristics: Slope classes 0-40, 41-70, 71+%, Aspect 1-66, 67-156, 157-246, 247-360' Alphabetic by vegetation, then by slope, then aspect. Acres are accumulated by vegetation, slope classes, and aspect classes.
4.	'Formation and Vegetation - Detail' Alphabetic by geology and then by vegetation. Acre totals are accumulated for vegetation.
5.	'Vegetation, Slope,Formation, Aspect - Detail' 'Table Characteristics: Slope classes 0-40, 41-70, 71+%, Aspects 1-66, 67-156, 157-246, 247-360' Alphabetic by vegetation, then by slope, then geology, then aspect. Acres are accumulated by vegetation,slope, and aspect.
6.	'Vegetation, Geol-Soil, Slope, Aspect - Detail' 'Table Characteristics: Slope classes 0-40, 41-70, 71+%, Aspects 1-66, 67-156, 157-246, 247-360' Alphabetic by vegetation, geology-soils combined, slope, aspect. Acres accumulated by vegetation, slope classes, and aspects.
7.	'Ownership, Ecosystem, Slope, Aspect, Geology-Soils' 'Table Characteristics: Slope classes 0-40, 41+%, Aspects 1-156, 157-246, 247-360' Alphabetic by ownership, then by ecosystem, then by slope, then aspect, then geology-soils. Acre totals are accumulated for ownership, ecosystem, slope, aspect, and geology-soils.
8.	'Ecosystem, Elevation, Slope, Aspect, Ownership' 'Table Characteristics: Ecosystem 4CC, Slope classes 0-40, 41+%, Aspect 1-156, 157-246, 247-360.' Alphabetic by ecosystem, then by elevation, then slope, then aspect, then ownership. Acre totals are accumulated by ecosystem, ownership, slope, and aspect.

Table

9. 'Ecosystem, Geology-Soils, Slope, Aspect'
'Table Characteristics: Ecosystem (4CC), Slope classes 0-40, 41+%, Aspect 1-156, 157-246, 247-360'
Alphabetic by ecosystem, then by geology-soils combined, then by slope, then aspect. Acre totals are accumulated by ecosystem, geology-soils, slope classes, and aspect classes.

10. 'Geology-Soils, Slope, Aspect'
'Table Characteristics: Slope classes 0-70, 71+%, Aspect 1-156, 157-246, 247-360'
Alphabetic by geology-soils combined, then by slope, then by aspect. Acre totals are accumulated by geology-soils, slope classes, and aspect classes.

11. 'Basin-Forest, Administrative Unit, Ownership, Ecosystem, Slope, Elevation, Aspect'
'Table Characteristics: Lodgepole pine, Spruce-Fir, (and other forest types) Canopy Codes: Elev Zones 1-9, Slope classes 0-40 coded L, over 40 coded G, Aspect 156-246 coded S, other aspects coded O'
Alphabetic by basin-forest, administrative unit, ownership, ecosystem, then by slope, then aspect. Slopes, aspects, and elevations are interpreted into groups and assigned sets of codes that are printed as part of the vegetation field:

Slope Code 'L' less than 41, 'G' greater than 40.
Aspect Code 'S' is south azimuths 156 to 246.
Aspect Code 'O' is all other aspects.
Elevation Code '3' is up to 8100
" '4' is from 8100 - 8400 feet.
" '5' " 8400 - 8900 "
" '6' " 8900 - 9500 "
" '7' " 9500 - 10500 "
" '8' " 10500 - over "

Acre totals for vegetation, owners, slope, aspect and codes. Codes possible are 3L 3G, 4LS 4LO 4GS 4GO, 5LS 5LO 5GS 5GO, 6LS 6LO 6GS 6GO, 7LS 7LO 7GS 7GO, 8LS 8LO 8GS 8GO.

12. 'Access, Precipitation, Admin Unit, Vegetation'
'Table Characteristics: blank
Alphabetic by access, then by precipitation, then by admin unit, then by vegetation. Acre totals are accumulated for vegetation.

Table

13. 'Administrative Unit, Vegetation, Slope, Aspect'
'Table Characteristics: Classes - Slope 0-40, 41-60, 61+%, Aspect 0-45, 46-135, 136-225, 226-315, 316-360 azimuth'
Alphabetic by admin unit, then by vegetation, then slope, then then aspect. Acre totals are accumulated by vegetation, slope classes, and aspect classes.

14. 'Ownership, Vegetation, Formation, Soils, Precipitation, Aspect, Slope'
'Table Characteristics: Classes - Slope 0-40, 41-60, 61+%, Aspect 0-45, 46-135, 136-225, 226-315, 316-360 azimuth'
Alphabetic by ownership, vegetation, geology, soils, precip, aspect, and slope. Acre totals are accumulated by ownership, vegetation, soils, aspect, and slope classes.

15. 'Master File Sorted by Card Columns 17-24, 52-56, By Cardtype'
Alphabetic by the fields in card columns 77-80 of the original cardtype, then by 17-24, then 52-56.

16. 'Master File Sorted by Card Columns 60-66, 17-24, By Cardtype'
Alphabetic by Cardtype, then by 60-66, then 17-24.

17. 'Master File Sorted by Card Columns 36-48, 17-24, By Cardtype'
Alphabetic by Cardtype, then 36- 48, then 17-24.

SPECIAL DATA TABLES

Does not apply to the map file card SH01. Includes field data cards, index cards, and interpretation cards.

Table

01	Location, card type (4cc), Data level
15	Master file is sorted cc 17-24, then 52-56, by BLISTORS card type. Listed in table format.
16	Master file is sorted cc 60-66, then 17-24 by BLISTORS card type. Listed in table format.
17	Master file is sorted cc 36-48, then 17-24 by BLISTORS card type. Listed in table format.
22	Card type, Data level, Location
23	Multi Accomplishment Report data sorted by project.
24	Multi Accomplishment Report data sorted by activity and project.

INTERPRETED MAPS

These take the SH01 map files and prepares a map. Use the extract program to get the characteristics you want mapped.

18	Ecosystem and interpretation of slope, aspect, and elevation criteria as developed in Table 11. 40 acre print cells. 160 acre cells are converted into 40 acre print cells.
19	Ecosystem and geology are printed in 40 acre print cells. 160 acre cells are converted into 40 acre print cells.
25	Index to Line numbers in map form.
26	Ecosystem and canopy map.

SUMMARY
TABLES

Sample Runs

Batch run, about 1000 lines to be extracted from HYDRORIO, tape number F07002. Tables #01, 03, 07, & 10 to be run. Extract on forest codes RG and SJ in lines 40000 through 55000.

```
@RUN,P/RN R02TS1,1102093720AB,SPF,10,500/11000
@USE INN,HYDRORIO
@ASG,T INN.,U9V,F07002
@ADD R2PROG*R2PROG.HYDROSTART
@ADD R2PROG*R2PROG.HYDROIN
40000-55000
(blank card)
RG,SJ
(blank card)
(blank card)
(blank card)
(blank card)
(blank card)
(blank card)
@ADD R2PROG*R2PROG.HYDROXTRACT
@ADD R2PROG*R2PROG.HYDROREP
01 THIS IS AN EXTRACT ON THE RIO GRANDE FILE
03 EXTRACT ON RIO GRANDE FILE: FORESTS RG, SJ
07 FORESTS RG, SJ ON RIO GRANDE FILE
10 RIO GRANDE FILE: FORESTS RG, SJ
00
```

Timeshare run, 3000 lines to be extracted from HYDROARAP, tape # F01149. Tables #01, 03, 07, 08 & 10 to be run. Extract lines 45523-47952 and lines 54892 through 55123 from HYDROARAP. Tables not to come out on the user's home terminal.

```
@RUN R02TS2,1102098520AB,SPF,20,915/16500
@USE INN,HYDROARAP
@ASG,T INN.,U9V,F01149
@ADD R2PROG*R2PROG.HYDROSTART
@ADD R2PROG*R2PROG.HYDROIN
45523-47952,54892-55123
(carriage return)      (note:  in timeshare, a carriage
(carriage return)       return is the same as a blank
(carriage return)       card)
(carriage return)
(carriage return)
(carriage return)
```

```
(carriage return)
(carriage return)
@ADD R2PROG*R2PROG.HYDROXTRACT
@ADD R2PROG*R2PROG.HYDROTIM/REP
@MSG PLEASE GIVE TO JOHN DOE
@MSG ARAPAHO NAT'L FOREST
@ADD R2PROG*R2PROG.HYDROREP
01 EXTRACT ON ARAPAHO FILE:  LINES 45524-47952,54892-55123
03
07
08
10
00
@ADD R2PROG*R2PROG.HYDROTIM/OUT
@FIN
```

Batch run, about 4500 lines to be extracted from HYDROWIND, tape #F01608. Tables 01, 12 to be run. Extract is to exclude lines 25457 through 35195, and is to include forest SH. The extracted data is written on a new tape called HYDROWINDB.

```
@RUN,P/RN R02TS3,1102023420XN,SPF,10,450/9900
@USE INN,HYDROWIND
@ASG,T INN.,U9V,F01608
@ADD R2PROG*R2PROG.HYDROSTART
@ADD R2PROG*R2PROG.HYDROIN
*25457-35195
(blank card)
SH
(blank card)
(blank cafd)
(blank card)
(blank card)
(blank card)
(blank card)
@ADD R2PROG*R2PROG.HYDROXTRACT
@ASG,TF HYDROWINDB,U9V
@COPY,M OUTT,HYDROWINDB
@COPY,M OUTT,HYDROWINDB
@COPY,M OUTT,HYDROWINDB
@MARK HYDROWINDB
@ADD R2PROG*R2PROG.HYDROREP
01 SHOSHONE NATIONAL FOREST LAND OUTSIDE SPECIFIED AREA
12 SHOSHONE NATIONAL FOREST LAND OUTSIDE 25457-35195
00
```

U.S. DEPARTMENT OF AGRICULTURE - HYDRO RESOURCE SURVEY - - TABLE 08 ECOSYSTEM, ELEVATION, SLOPE, ASPECT, OWNERSHIP 07/01/75
TABLE CHARACTERISTICS: ECOSYSTEM(4 CC), SLOPE CLASSES 0-40%, 41+% ASPECT& 0-156, 157-246, 247-360.

AREA: EXTRACT ON RIO GRANDE FILE LINES 500-600, 10000-10100, 55000-55100

LEGAL LOCATION MERIDIAN TOWNS RANGE	SECTN -AREA	BASIN FOREST COUNTY	WSHED FS SCS	ADMIN UNIT CODES	VEGETATION TYPE	ACRES	OWNER-SHIP	ACRES	TOPOGRAPHIC FEATURES-- LND FRM	SLOPE %	ACRES	ASPECT ASP	ACRES	ELEVT 100 FT.	GEOLOGY-SOILS COMPLEX FORMTN	SOIL	ACRES	ANNL PPT. INCH	ROAD ACC-ESS	LINE NO.
N032.0N004.0E	07DF	RRG	AT 21 27	LSSJ	A8		M			02		090	40		08					1
N044.0N005.0E	20AB	RRG	SG 49 33		A8		M			06		190			091PV					2
N044.0N005.0E	20AA	RRG	SG 49 33		A8		M			06		190	80		091PV					3
N035.0N006.0E	16DB	RRG	CN 25 14		A8		M			08		090	40		091PV					4
N044.0N005.0E	21BC	RRG	SG 49 33		A8		M			08		280	40		091HA					5
N035.0N006.0E	17BA	RRG	CN 25 14		A8		M			10		210	40		091PV					6
N035.0N106.0E	16AB	RRG	CN 25 14		A8		M			12		040			091PV					7
N035.0N006.0E	16AA	RRG	CN 25 14		A8		M			12		040			091PV					8
N035.0N006.0E	17AB	RRG	CN 25 14		A8		M			12		070			091PV					9
N044.0N005.0E	21AD	RRG	SG 51 33		A8		M			12		070			091HA					10
N044.0N005.0E	21AA	RRG	SG 51 33		A8		M			12		070			091HA					11
N032.0N004.0E	13CD	RRG	CN 21 27		A8		M			12		140			090LS					12
N032.0N004.0E	13CC	RRG	CN 21 27		A8		M			12		140			090LS					13
N032.0N004.0E	13CB	RRG	CN 21 27		A8		M			12		140	320		090LS					14
N035.0N006.0E	17DC	RRG	CN 25 14		A8		M			12		190			091PV					15
N035.0N006.0E	17DB	RRG	CN 25 14		A8		M			12		190	80		091PV					16
N044.0N005.0E	24AA	RRG	SG 51 33		A8		M			12		340	40		101PV					17
N035.0N006.0E	17CD	RRG	CN 25 14		A8		M			14		050			101PV					18
N035.0N006.0E	17CB	RRG	CN 25 14		A8		M			14		050	80		101PV					19
N044.0N005.0E	23AC	RRG	SG 51 33		A8		M			14		350	40		091PV					20
N044.0N005.0E	21DD	RRG	SG 51 33		A8		M			16		080			091HA					21
N044.0N005.0E	21DA	RRG	SG 51 33		A8		M			16		080			091HA					22
N032.0N004.0E	13DC	RRG	CN 21 27		A8		M			16		100	120		090LS					23
N044.0N005.0E	20BA	RRG	SG 49 33		A8		M	960		16		350	40		091PV					24
N044.0N005.0E	23DA	RRG	SG 51 33		A8		P	40		20		070	40		091PV					25
N044.0N005.0E	20DB	RRG	SG 49 33		A8		M	40		22		330			091CA					26
N044.0N005.0E	20DC	RRG	SG 49 33		A8		P	40		22		330	80		091CA					27
N032.0N004.0E	09BB	RRG	AT 21 27		A8		M			24		240	40		101BB					28
N044.0N005.0E	19BG	RRG	SG 49 33		A8		M			24		330	40		091PV					29
N044.0N005.0E	22BC	RRG	SG 51 33		A8		M			28		210	40		091HA					30
N032.0N004.0E	13BA	RRG	CN 21 27		A8		M			34	1240	090	40		101CA					31
N032.0N004.0E	08AA	RRG	AT 21 27		A8		M			44		250			091BB					32
N032.0N004.0E	08AB	RRG	AT 21 27		A8	1320	M			44	80	250	80		091BB					33
N035.0N006.0E	16DA	RRG	CN 25 14		D8M		M			08		090	40		091PV					34
N044.0N005.0E	18CD	RRG	SG 49 33		D8M		M			14		290			091PV					35
N044.0N005.0E	19CD	RRG	SG 49 33		D8M		M			16		310			091PV					36
N044.0N005.0E	19CC	RRG	SG 49 33		D8M		M			16		310			091PV					37
N044.0N005.0E	19CB	RRG	SG 49 33		D8M		M			16		310			091PV					38
N044.0N005.0E	19CA	RRG	SG 49 33		D8M		M			16		310			091PV					39
N044.0N005.0E	20BC	RRG	SG 49 33		D8M		M			16		350			091PV					40
N044.0N005.0E	19DG	RRG	SG 49 33		D8M		M			20		280			091PV					41
N044.0N005.0E	19AD	RRG	SG 49 33		D8M		M			20		280			091PV					42
N044.0N005.0E	19AC	RRG	SG 49 33		D8M		M			20		280			091PV					43
N044.0N005.0E	19AB	RRG	SG 49 33		D8M		M			20		280			091PV					44
N044.0N005.0E	19BA	RRG	SG 49 33		D8M		M			22		250			091PV					45
N044.0N005.0E	19BD	RRG	SG 49 33		D8M		M			22		250			091PV					46
N044.0N005.0E	19BC	RRG	SG 49 33		D8M		M			22		250			091PV					47
N044.0N005.0E	19DA	RRG	SG 49 33		D8M		M			24		330			091CA					48
N044.0N005.0E	18DD	RRG	SG 49 33		D8M	640	M			26		350			091PV					49
N044.0N005.0E	18CA	RRG	SG 49 33		D8P		M			14		290			091PV					50
N044.0N005.0E	20CD	RRG	SG 49 33		D8P		M			20		340			091CA					51

U.S. DEPARTMENT OF AGRICULTURE - HYDRO RESOURCE SURVEY - - TABLE 18 LEGAL LOCATION, DETAIL 01/12/76
TABLE CHARACTERISTICS: LPOLE, SPRUCE CANOPY CODES: ELEV ZONES 1-9: SLOPE 40%L-G: ASPECT 156-246 = S. REST ASP = O.

M TOWNS RANGE PROGRAM *MAPMAKER* CELL TOPLINE IS ECOSYSTEM AND BOTTOMLINE IS INTERP. EACH 40 ACRE CELL IS 4CHAR BY 2 LINES.

Indicates pieces of data not shown in map form.

```
6013.0N 078.0W .LP8MLP8WLP8PNC  LP8MLP7MLP7WLP8M LP8MLP9ALP8WSF9A SF9ALP8MLP8MLP8M LP9ALP7WLP8MLP8P LP8WLP8WNF  NF  .
               . 6LO 5LS 5LS     6LS 6LS 6LO 6LO  6LS 6LS 6LS 6LO  6LO 6LO 6LO 6LO  6LS 6LO 6LS 6LO  6LO 5LO      .
               .LP8MNC  LP9ANF   LP9ALP7MLP7WNF   LP8MLP8MLP8WLP9A LP9ALP8WLP8WLP8M LP8MLP8MLP8MLP8M LP8MLP8PNO  LP8M.
               . 5LO     5LO     5LS 5LS 5LO      6LO 6LO 6LO 6LO  6LS 6LS 6LO 6LO  6LO 6LO 6LS 6LS  6LO 5LO     5LO.
               .LP8WLP8MLP8WLP8M LP9ALP8WNC  NC   LP8WLP8WLP8MLP6  LP8MLP6 LP7MLP6  LP8MLP8MLP8WLP8M LP8MNF  NF  LP8M.
               . 6LO 5LO 5LO 5LO  5LS 5LO         6LO 6LO 6LO 6LO  6LS 6LS 6LO 6LO  6LS 6LO 6LO 5LO  5LO         5LO.
               .LP8WLP8WLP9ALP9A LP9ALP8PLP8MLP9A LP9ALP8PLP8MLP8W LP8WLP8WLP8MLP7M LP8MLP8PLP9ALP8M NF  LP8MNF  NF  .
               . 6LO 6LO 6LO 6LO  6LO 6LO 6LO 6LO  5LO 6LO 6LS 6LO  6LO 6LS 6LS 6LO  5LO 5LO 5LO 5LS      5LO        .0000000

6013.0N 078.0W .LP8MLP9ALP9ALP9A LP8MLP8MLP7WLP9A NC  NF  LP8MLP8W LP8MLP8WLP7MLP8M LP8MLP8MLP8WLP8W LP9ALP8PLP9ALP9A.
               . 6LO 6LO 6LO 6LO  6LO 6LO 6LO 6LO         6LS 6LS  6LO 6LO 6LO 6LO  6LO 5LS 5LO 5LS  5LO 5LO 5LO 5LO.
               .LP9ALP9ALP9ALP8W LP7WLP8MLP7WLP9A LP8MLP8MLP9ANF   LP8MLP8MLP8MLP8M LP8MLP7MLP8WLP8W NF  LP8PLP8MLP9A.
               . 6LO 6LO 6LO 6LO  6LO 6LO 6LO 6LO  6LO 6LO 6LO      6LO 6LO 6LO 5LO  5LO 6LO 5LO 5LO      5LO 6LS 5LO.
               .LP8WLP8WLP9ALP9A LP7WLP7WLP9ALP8M LP9ALP9ALP9ALP9A LP8MLP8MLP7MLP7M LP8MLP8MLP8MLP8M LP8WLP8WLP8MLP8M.
               . 6LO 6LO 6LO 6LO  6LS 6LO 6LO 6LO  6LO 6LO 6LO 6LO  6LO 6LO 6LO 6LO  6LO 6LO 5LO 5LO  5LO 6LO 6LO 5LS.
               .LP9ALP8WLP8WLP8W LP9ALP9ALP8MLP8M SF8MLP9ALP8WLP8W LP7WLP8WLP8WLP8W LP7MLP7MLP8WLP8W LP8WLP8WLP8MLP8M.
               . 6LO 6LO 6LO 6LO  6LO 6LO 6LO 6LS  6LO 6LO 6LS 6LO  6LO 6LO 6LO 6LO  6LO 6LS 5LO 5LO  6LO 6LO 6LO 5LO.0000000

6013.0N 078.0W .LP9ALP9ALP9ALP9A LP8WLP8PLP9ALP8M LP9ALP9ANC  LP8W LP8WLP7WLP8WLP7W NC  LP8WLP8WLP8M LP8WLP8WLP8MLP8M.
               . 6LS 6LS 6LO 6LO  6LO 6LO 6LO 6LO  6LO 6LO     6LS  6LO 6LO 6LO 6LS      5LO 6LO 6LO  6LO 6LS 5LO 5LO.
               .LP8WLP8PLP9ALP9A LP9ALP9ALP9ALP8W NC  LP9ALP9ALP9A LP8WLP8WNC  LP8W LP8WLP8MNC  NC   LP8WLP8MLP8MLP9A.
               . 6LO 6LO 6LO 6LS  6LO 6LO 6LO 6LO       6LO 6LO 6LO  6LO 6LO     6LO  6LO 6LO         6LO 5LO 5LS 5LS.
               .LP8MLP8MLP8WLP8M LP8MNF  LP8MLP8W LP9ALP9ALP9ALP7M LP8WLP8MLP7MLP8M LP7MLP7WLP7WLP8M LP8WLP7WLP8MLP7W.
               . 6LS 6LS 6LO 6LO  6LO     6LO 6LO  6LO 6LO 6LO 6LO  6LO 6LO 6LO 6LO  6LO 6LO 6LO 6LO  5LO 6LO 6LO 6LO.
               .LP8MLP8WLP8MLP8M LP8WLP8MLP8MLP9A LP9ANC  LP8WLP7M NC  LP8MLP7MLP8M LP7MLP8MLP8WLP9A LP7WLP7WLP7MLP8W.
               . 6LS 6LS 6LO 6LS  6LO 6LO 6LO 6LO  6LO     6LO 6LO      6LO 6LO 6LS  6LS 6LS 6LO 5LO  6LO 6LO 6LS 6LO.0000000

6013.0N 078.0W .LP8MLP8WNF  LP8M LP8MLP8MLP8MNC  LP9ALP8MLP8MNF   LP7WLP7WLP8MLP7M LP8PLP8MLP9ALP9A LP8MLP9ALP8MLP7W.
               . 6LO 6LS     6LS  6LO 6LO 6LO      6LO 6LO 6LO      6LO 6LO 6LO 6LO  6LO 6LO 6LO 6LO  6LO 6LO 6LO 6LO.
               .LP8WLP8PNF  LP8W LP8MLP8WLP8MLP8M LP9ALP9ALP8MLP8M LP8MLP7WLP7WLP8M LP8MLP8MLP8MLP8M LP8WLP8MLP8WLP8W.
               . 6LO 6LO     6LS  6LO 6LO 6LO 6LO  6LS 6LS 6LS 6LS  6LS 6LS 6LO 6LO  6LO 6LO 6LO 6LO  6LO 6LO 6LS 6LO.
               .LP8PNC  LP9ALP9A LP9ALP8WLP9ALP7M LP8MLP8MLP8MTOWN LP8WLP8MNF  LP8M LP8MLP8MLP9ALP8M LP8WLP8WLP8WNC  .
               . 6LO     6LO 6LO  6LO 6LO 6LO 6LO  6LS 6LS 6LS      6LS 6LS     6LO  6LO 6LS 6LO 6LO  6LO 6LS 6LS     .
               .LP9ALP9ALP8MLP8W LP8WLP8WLP9ALP9A LP8MLP9ALP9ANC  LP8MLP8MNF  NF   LP8MLP8MLP8PLP8P LP8WLP8WLP9ALP8M.
               . 6LO 6LO 6LO 6LO  6LO 6LO 6LO 6LO  6LO 6LO 6LO      6LO 6LO         6LO 6LO 6LS 6LS  6LO 6LO 6LO 6LO.0000000

6013.0N 078.0W .LP9ALP8MSF9ALP8M LP8MLP8WLP9ALP9A LP9ALP8MLP8MLP8M LP8MLP8MLP8MNF   LP8MLP8WNF  NF   LP8MLP8MLP8WLP8W.
               . 6LO 6LO 6LS 6LS  6LO 6LO 6LO 6LO  6LO 6LO 6LO 6LO  6LS 6LO 6LO      6LS 6LO        6LS 6LS 6LO 6LO.
               .LP8MLP8MLP9ALP8M LP8MLP8PLP8WLP9A LP8WLP8WLP8WNF   LP8MLP8MLP8MLP8M LP9ALP9ALP7WLP8W LP7WLP8MLP8WLP8M.
               . 6LO 6LO 6LS 6LS  6LO 6LO 6LO 6LO  6LO 6LO 6LO      6LO 6LO 6LO 6LO  6LS 6LO 6LO 6LO  6LO 6LO 6LO 6LO.
               .NF  LP8MLP8MNC   LP8MLP9ALP8WLP8M LP7MNF  LP8WLP8M LP8WLP8MLP8MLP8M NC  LP8PLP7WLP9A LP9ALP8MLP8PLP8M.
               .     6LS 6LO      6LO 6LO 6LO 6LO  6LO     6LO 6LO  6LO 6LO 6LS 6LS      6LS 6LO 6LO  6LO 6LO 6LS 6LO.
               .NC  LP8MLP8WLP8M LP8MLP8MLP8WNC   LP7MNC  LP8MLP8M LP8MLP8MLP8MLP8M NC  NC  LP8MLP8M LP8PLP8PLP8PLP8M.
               .     6LO 6LO 6LO  6LS 6LO 6LO      6LO     6LO 6LO  6LS 6LS 6LS 6LS          6LS 6LO  6LO 6LO 5LS 5LO.0000000

6013.0N 078.0W .LP8MLP8MNF  NC   LP9ALAKELP7MLP9A LP9ALP7MLP7WLP7W LP8MLP8MLP8PLP8W LP8WLP8WNC  LP8P LP8WLP9ALP9ALP8M.
               . 6LO 6LO          6LO     6LO 6LO  6LO 6LO 6LO 6LO  6LS 6LO 6LO 6LO  6LO 6LO     6LO  6LO 5LO 5LO 5LO.
               .LP9ALP8MNF  NF   LP8MLP7PLP8WLP8M LP8MLP7MLP7MLP7W NC  LP8WLP9ALP8M LP8MLP8MLP8MLP9A LP8PLP9ALP9ALP9A.
               . 6LO 6LO          6LO 6LO 6LO 6LO  6LO 6LO 6LO 6LO      6LO 6LO 6LO  6LO 6LO 6LO 6LO  6LO 6LO 6LO 5LO.
               .LP7MLP8MLP8MLP7M LP8MLP8MLP8WLP8M LP8MLP9ALP8MNC   LP8MLP8PLP9ALP8M LP9ALP8MLP8MLP9A LP8PLP9AA8  LP7M.
               . 6LO 6LO 6LS 6LS  6LO 6LO 6LS 6LS  6LO 6LO 6LO      6LO 6LO 6LO 6LO  6LO 6LO 6LO 6LS  6LS 6LS     6LS.
               .NC  LP8MLP8MLP6  LP8MLP8PLP7MLP7M LP7MLP7MLP7MLP9A LP8MLP8PLP8PLP8M LP8MLP9ALP8MLP8M LP8PLP9ALP8WLP9A.
               .     6LO 6LO 6LO  6LS 6LS 6LO 6LO  6LO 6LO 6LO 6LO  6LO 6LO 6LO 6LO  6LO 6LO 6LO 6LS  6LS 6LS 6LO 6LO.0000000
```

U.S. DEPARTMENT OF AGRICULTURE - HYDRO RESOURCE SURVEY - - TABLE 20 SUMMARY - OWNERSHIP, VEGETATION, PRECIP, SOILS 08/23/76
TABLE CHARACTERISTICS: LOCATION & LINE NUMBER INDICATES DATA BREAK POINTS

AREA: TEST SUMMARY

LEGAL LOCATION MERIDIAN TOWNS RANGE	SECTN -AREA	BASIN FOREST COUNTY	WSHED FS SCS	ADMIN UNIT CODES	VEGETATION TYPE	ACRES	OWNER-SHIP	ACRES	TOPOGRAPHIC LND FRM	SLOPE %	ACRES	FEATURES-- ASPECT ASP	ACRES	ELEVT 100 FT.	GEOLOGY-SOILS COMPLEX FORMTN	SOIL	ACRES	ANNL PPT. INCH	ROAD ACCESS	LINE NO.
6013.0N081.0W	29AC	NOT CB	AA	P4716	CP2707	440	B		06			090		077	TPM	3347		18		11
6013.0N081.0W	07CC	NOT CB	AA	P4716	CP3P	400	B		03			045		076	TPM	3347		16		21
6014.0N081.0W	19BC	NOT CB	AA	P4716	CP3707		B		09			090		077	PC	3347	1440	16		36
6012.0N080.0W	08D	NOT CB	AA	P4716	CP3707		B		12			210		080	TPM	4107	160	16		87
6013.0N081.0W	18CB	NOT CB	AA	P4716	CP3707		B		02			360		078	TPM	3347	1240	18		65
6013.0N081.0W	32DA	NOT CB	AA	P4716	CP3707	2320	B		11			045		078	PC	4104	320	20		70
6013.0N080.0W	30D	NOT CB	AA	P4716	CP4706		B		06			300		081	PC	3344	1600	16		98
6014.0N081.0W	06AA	NOT CB	AF	P4716	CP4706		B		06			270		077	PC	3347	1680	16		140
6014.0N081.0W	05AA	NOT CB	AF	P4716	CP4706		B		19			180		079	PC	4104	6960	16		299
6013.0N081.0W	22AA	NOT CB	AA	P4716	CP4706	10320	B		11			225		078	TPM	3347	80	18		301
6013.0N081.0W	01AA	NOT CB	AB	P4716	CP5706	520	B		33			090		074	PC	4104		16		314
6013.0N082.0W	24CC	NOT CB	AA	P4716	CP5707	1440	B	15440	11			045		080	PC	4104	1960	25		326
6013.0N082.0W	06AB	NOT CB	AE	P4716	CP2409	40	P		08			015		079	PC	3350	40	20		327
6013.0N082.0W	14AA	NOT CB	AA	P4716	CP2707		P		04			045		078	TPM	3347	2480	20		389
6013.0N082.0W	14AB	NOT CB	AA	P4716	CP2707	2560	P		04			045		079	TPM	4104	80	20		391
6014.0N081.0W	05CD	NOT CB	AF	P4716	CP3H		P		13			150		074	PC	3344	40	16		392
6014.0N081.0W	07CB	NOT CB	AF	P4716	CP3H		P		05			220		073	PC	3347	320	16		400
6014.0N081.0W	04BA	NOT CB	AF	P4716	CP3H	480	P		50			240		076	PC	4104	120	18		403
6013.0N082.0W	13AB	NOT CB	AA	P4716	CP3HP	3200	P		03			050		078	TPM	3347		20		483
6013.0N081.0W	29DD	NOT CB	AA	P4716	CP3P	1280	P		01			060		077	TPM	3347		18		515
6014.0N081.0W	07DB	NOT CB	AF	P4716	CP3707		P		02			220		073	PC	3347	11640	16		634
6013.0N080.0W	31C	NOT CB	AA	P4716	CP3707		P		08			260		078	PC	4107	160	16		635
6012.0N080.0W	06A	NOT CB	AA	P4716	CP3707		P		01			320		078	TPM	3347	2240	17		649
6012.0N081.0W	14A	NOT CB	AA	P4716	CP3707		P		04			045		079	TPM	4104	160	17		650
6012.0N081.0W	11B	NOT CB	AA	P4716	CP3707		P		03			045		079	TPM	4107	320	17		652
6013.0N081.0W	29BB	NOT CB	AA	P4716	CP3707		P		04			080		078	TPM	3347	2800	18		722
6013.0N082.0W	04AB	NOT CB	AE	P4716	CP3707		P		07			360		079	TPM	3350	320	18		730
6013.0N082.0W	04CB	NOT CB	AE	P4716	CP3707		P		07			045		080	PC	4100	240	18		736
6012.0N081.0W	03B	NOT CB	AA	P4716	CP3707		P		03			045		078	TPM	4104	640	18		740
6013.0N081.0W	19BB	NOT CB	AA	P4716	CP3707		P		02			045		078	TPM	4107	160	18		744
6012.0N081.0W	04D	NOT CB	AA	P4716	CP3707		P		15			030		080	PC	4104	160	19		745
6013.0N082.0W	13DB	NOT CB	AA	P4716	CP3707		P		03			050		078	TPM	3347	400	20		755
6013.0N082.0W	06AA	NOT CB	AE	P4716	CP3707		P		08			015		078	PC	3350	600	20		770
6013.0N082.0W	10DB	NOT CB	AA	P4716	CP3707	15840	P		05			040		079	TPM	4104	480	20		782
6013.0N081.0W	23AC	NOT CB	AA	P4716	CP4706		P		12			225		078	PC	3344	120	16		785
6013.0N081.0W	05DB	NOT CB	AA	M4716	CP4706		P		02			090		076	PC	3347	1560	16		821
6014.0N081.0W	09BB	NOT CB	AF	P4716	CP4706		P		13			340		079	PC	4104	2360	16		874
6013.0N080.0W	31B	NOT CB	AA	P4716	CP4706		P		10			270		079	PC	4107	640	16		878
6013.0N081.0W	22AC	NOT CB	AA	P4716	CP4706		P		11			225		077	TPM	3347	400	18		882
6014.0N081.0W	04AA	NOT CB	AF	P4716	CP4706	5640	P		50			340		080	PC	4104		18		896
6014.0N081.0W	16CC	NOT CB	AB	P4716	CP5706	360	P		20			360		075	PC	4104	920	16		905
6013.0N082.0W	04CD	NOT CB	AE	P4716	CP5707		P		07			045		081	PC	4100	80	18		907
6013.0N081.0W	19CB	NOT CB	AA	P4716	CP5707		P		13			120		080	TPM	4107	160	18		911
6013.0N082.0W	06DB	NOT CB	AE	P4716	CP5707		P		09			020		080	PC	4104	640	20		927
6013.0N081.0W	30AB	NOT CB	AA	P4716	CP5707		P		08			060		079	PC	4107	320	20		935
6013.0N082.0W	24CA	NOT CB	AA	P4716	CP5707		P		11			045		080	PC	4104	640	25		942
6013.0N082.0W	24AB	NOT CB	AA	P4716	CP5707	2160	P	31560	18			340		078	PC	4107	320	25		950
6013.0N082.0W	14AB	NOT CB	AA	P4716	CP2707		S		04			045		078	TPM	3347	160	20		954
6013.0N082.0W	14BC	NOT CB	AA	P4716	CP2707	240	S		04			045		079	TPM	4104	80	20		956
6013.0N081.0W	16BB	NOT CB	AA	P4716	CP3P	280	S		08			140		078	TPM	3347		16		963
6013.0N082.0W	13DD	NOT CB	AA	P4716	CP3707	1040	S		03			050		078	TPM	3347		20		989

U.S. DEPARTMENT OF AGRICULTURE - HYDRO RESOURCE SURVEY - - TABLE 28 SUMMARY - BAS-FOR, ADM, OWN, ECO, SLP, ELV, ASP 04/12/77
TABLE CHARACTERISTICS: TABLE 11 CODES. LINE NOS INDICATE DATA BREAK PTS

AREA: TEST

LEGAL LOCATION		BASIN	WSHED	ADMIN	VEGETATION		OWNER-		TOPOGRAPHIC FEATURES--					ELEVT	GEOLOGY-SOILS			ANNL	ROAD	LINE
MERIDIAN TOWNS RANGE	SECTN -AREA	FOREST COUNTY	FS SCS	UNIT CODES	TYPE	ACRES	SHIP	ACRES	LND FRM	SLOPE %	ACRES	ASPECT ASP	ACRES	100 FT.	FORMTN	COMPLEX SOIL	ACRES	PPT. INCH	ACC- ESS	NO.
6020.0N066.0W	01AA	NOT PL	DE	U2719	CPDC 3L		P			01		090		054	TA	149K	3720	15		93
6020.0N066.0W	18BA	NOT PL	CM	U2719	CPDC 3L		P			02		090		056	TA	151J	480	16		105
6020.0N066.0W	04BB	NOT PL	CM	U2719	CPDC 3L		P			01		090		055	TA	151K	40	16		106
6020.0N067.0W	02CA	NOT PL	CM	U2719	CPDC 3L		P			01		360		055	TWR	142B	440	16		117
6020.0N066.0W	06AC	NOT PL	CM	U2719	CPDC 3L	5960	P			02		350		054	TWR	151J	1280	16		149
6020.0N067.0W	04AA	NOT PL	CM	U2719	CP15 3L		P			01		135		054	QAL	142B	240	16		155
6020,0N066,0W	04AC	NOT PL	CM	U2719	CP15 3L		P			02		045		055	TA	149K	1360	16		189
6020.0N065.0W	07CB	NOT PL	DE	U2719	CP15 3L		P			01		090		054	TA	151K	200	15		194
6020.0N067.0W	06BA	NOT PL	CP	U2719	CP15 3L		P			02		270		058	TA	153E	160	16		198
6020.0N067.0W	01BA	NOT PL	CM	U2719	CP15 3L		P			02		090		054	TWR	142B	600	16		213
6020.0N067.0W	01DB	NOT PL	CM	U2719	CP15 3L		P			04		090		054	TWR	151B	360	16		222
6020.0N066.0W	04CA	NOT PL	CM	U2719	CP15 3L		P			02		180		055	TWR	151K	40	16		223
6020.0N067.0W	06CA	NOT PL	CP	U2719	CP15 3L	3120	P			04		315		058	TWR	153E	160	16		227
6020.0N066.0W	03CC	NOT PL	DE	U2719	CP16 3L		P			02		090		055	TA	149K	760	16		246
6020.0N066.0W	26AC	NOT PL	DE	U2719	CP16 3L		P			06		120		055	TA	151J	20000	15		746
6020.0N066.0W	04DC	NOT PL	DE	U2719	CP16 3L		P			02		090		055	TA	151K	1120	16		774
6020.0N066.0W	30AC	NOT PL	CM	U2719	CP16 3L		P			07		315		058	TWR	151J	3520	16		862
6020.0N066.0W	04CB	NOT PL	CM	U2719	CP16 3L	25520	P			01		360		055	TWR	151K	120	16		865
6020.0N067.0W	03AA	NOT PL	CM	U2719	CP25 3L	560	P			01		045		054	TWR	142B		16		879
6020.0N067.0W	08DB	NOT PL	CM	U2719	CP46 3L		P			05		180		056	QAL	142B	1200	16		895
6020.0N067.0W	05BA	NOT PL	CM	U2719	CP46 3L		P			01		090		055	TA	142E	160	16		899
6020.0N067.0W	06AD	NOT PL	CM	U2719	CP46 3L		P			08		045		058	TA	153E	160	16		903
6020.0N067.0W	08BA	NOT PL	CM	U2719	CP46 3L		P			02		090		056	TWR	142B	160	16		907
6020.0N067.0W	06DD	NOT PL	CM	U2719	CP46 3L		P			07		090		058	TWR	142E	560	16		921
6020,0N067.0W	01DC	NOT PL	CM	U2719	CP46 3L		P			02		045		054	TWR	151B	120	16		924
6020.0N067.0W	07BB	NOT PL	CM	U2719	CP46 3L	2520	P	37680		05		180		057	TWR	153E	720	16		942
6020.0N066.0W	16AC	NOT PL	DE	U2719	CP16 3L	1920	S	1920		05		090		056	TA	151J	1920	16		990

IF FINISHED, ENTER 00 INSTEAD OF ANOTHER TABLE NUMBER

ENTER TABLE NUMBER XX AND AREA TITLE (78)

Summary

The following commands start out the package, regardless of whether it is timeshare or batch:

```
@RUN,P/RN RUN-ID,ACCOUNT#,QUALIFIER,10,500/11000
(@RUN RUN-ID,ACCOUNT#,QUALIFIER,10,500/11000  in timeshare mode)
@USE INN,master file name
@ASG,T INN.,U9V,FXXXXX  (XXXXX = tape number)
@ADD R2PROG*R2PROG.HYDROSTART
@ADD R2PROG*R2PROG.HYDROIN


xxxxxx-xxxxxx,  .  .  .,xxxxxx-xxxxxx     line ranges
.
.
.
.
(blank card)
xx,xx,xx,.  .  .,xx  or  (blank card)     forest codes
xx,xx,xx,.  .  .,xx  or  (blank card)     county codes
xx,xx,xx,.  .  .,xx  or  (blank card)     FS watershed codes
xx,xx,xx,.  .  .,xx  or  (blank card)     SCS watershed codes
xxxxxx,xxxxxx,. . ,xxxxxx
                     or  (blank card)     administrative unit
xxxxxxxxxxxxxxxx     or  (blank card)     legal location
xx=c&xx=c&...&xx=c,xx=c&...&xx=c
.                    or  (blank card)     SH01 column
:
.
(blank card if first SH01 is not blank)
@ADD R2PROG*R2PROG.HYDROXTRACT
```

For all batch jobs, and those timeshare jobs where the tables are to come out on the terminal, finish the job with the following:

```
@ADD R2PROG*R2PROG.HYDROREP
xxccccccccccccc. . .                      table # and area
.
.
.
00
```

For timeshare jobs where the tables are not to come out on the terminal, finish the job with:

```
@ADD R2PROG*R2PROG.HYDROTIM/REP
@MSG PLEASE GIVE TO . . .
@MSG ADDRESS . . .
```

```
@ADD R2PROG*R2PROG.HYDROREP
xxccccccccccc . . .                                    table # and area
.
.
.
00
@ADD R2PROG*R2PROG.HYDROTIM/OUT

@FIN
```

For extracts that exclude criteria, put an asterisk (*) in front of the card you want it applied to:

```
@XQT R2PROG*R2PROG.HYDROIN
*xxxxxx-xxxxxx,xxxxxx-xxxxxx,. . .,xxxxxx-xxxxxx     line range cards
(blank card)
*xx,xx,xx,. . .,xx or (blank card)                    forest card
*xx,xx,xx,. . .,xx or (blank card)                    county card
*xx,xx,xx,. . .,xx or (blank card)                    f. s. watershed
*xx,xx,xx,. . .,xx or (blank card)                    s.c.s. watershed
*xxxxxx,xxxxxx     or (blank card)                    administrat. unit
xxxxxxxxxxxxxxxx    (no exclusion)                    legal location
*xx=c&xx=c&...&xx=c,*xx=c&...&xx=c  or (blank card)   'SH01' columns
.
.
.
*xx=c&xx=c&...&xx=c,*xx=c&...&xx=c
(blank card if first SH01 not blank)
```

Remember that INCLUDE and EXCLUDE criteria cannot be on the same card or in the same category, but they may be in the same extract being made for an area. The 'SH01' column card is the only exception to the rule.

CHAPTER 4

ADVANCED DESCRIPTION AND USE OF COMPUTER PACKAGE

This description is for those with a thorough understanding of the UNIVAC 1108 EXEC VIII operating system. It is not intended for the novice.

This package actually consists of six programs and one sub-program. Their names and functions are:

HYDROBUILD	Builds or Updates the Master file having a unique location cc 1-16 for each data record.
HYDROINDEX	Builds or updates a master file having non-unique locations for several records.
HYDRO	Builds the parameter file for HYDROXTRACT.
HYDINSMSH (SMASH)	Subroutine to HYDRO.
HYDROXTRACT	Extracts the requested data from the Master file
HYDRORABBIT	Extracts the requested data from the Master file and produces punch cards.
HYDROREP	Report Program

(NOTE: HYDINSMSH is mapped together with HYDRO, creating the absolute element HYDROIN)

The source coding for these programs is kept on cards at the Denver Regional Office, ADP. The executable object code is kept on the catalogued tape file SPF*HYDRO.

The figure "FLOWCHART FOR HYDRO PACKAGE" shows the conceptual framework for the four programs.

HYDROBUILD - (COBOL).

This program can either build a new Master file, or update an existing Master file. The Master file is a COBOL-encoded file, standard labels, each block containing 50 records. The file is always left in order by location (cc 1-16). See SHØ1 format for map data layout.

HYDROBUILD requires that each data card have a unique location in cc 1-16.

This program uses four different cards for input. Their names, uses, and formats are:

TABLE-PRINT card: This card tells HYDROBUILD whether or not it is to print a listing of the new (or updated) master file. One such card is required at the beginning of the card deck. The format for this card is:

X

where, if X is a space, no listing is printed. If X is any character (except for an @), a listing is printed.

ADD card: This card tells HYDROBUILD to add the data in the card to the new or updated Master file. This card is a normal data card with a new location. If the location indicated on this card already exists on the Master file, a nasty message will be printed and the new data will be ignored.

normal data card

CHANGE card: This card tells HYDROBUILD to change certain data at a location on an existing master file. This card is also in normal data format except that the characters in cols 77-80 must be ␣␣␣C (␣ = blank). The following fields may be changed:

cc80 'C'

Vegetation, Basin-forest, County, F.S. Watershed, S.C.S. Watershed, Ownership, Access, Precipitation, Ad. unit, Land form, Slope, Aspect, Elevation, Geology, Hydrologic type, Soils, Year of Survey, Data quality.

For the field to be changed, all that need be done is to put the new data in the appropriate field on the change card (see SH01 format). If a field is not to be changed, that field is left blank on the card. Note that any combination of these fields may be changed using the same card; however, two or more cards may not be used to change the same legal location during the same run of HYDROBUILD. Also note that sub-fields subsidiary to the fields listed above may not be changed without changing the whole field (e.g.: the sub-field canopy-character may not be changed without changing the whole field to which it belongs, Vegetation).

Finally, legal location may not be changed using this card. In order to change a legal location, it is necessary to delete the old location (described in next paragraph) and add the new location (using the ADD card described above). This requires two separate runs because HYDROBUILD will reject a duplication in location 1-16 even though one card is a 'Delete' and the second one an 'Add' card.

The user may also change entire groups of records by entering the starting and ending location for the records to be changed. The first card has the starting location (cc 1-16), the field data to be changed, and cc 77-80 = 'bbbL'. The second card has ending location-B (cc 1-16), a match to location-A in (cc 17-32), and cc 77-80 = 'bbbX'.

cc80 'L' 'X'

DELETE card: This card tells HYDROBUILD to delete a legal location from an existing Master file. The card contains the location in cc 1-16 and the characters ßßßD (ß = blank) in cols 77-8Ø. Nothing else need be on the card.

cc80 'D'

If you wish to delete a range of consecutive locations show starting location in cc 1-16, ending location cc 17-32, and cc 77-80 as 'bbbD'. These, then, are the cards used by HYDROBUILD. Any errors will be printed on a file named PRIN.

Error Record File 'PRIN'

In order to create a new master file, use the following runstream:

New File

```
@RUN,Q/RN RØ2XXX,YOURACCOUNT#,QUALIFIER,15,5ØØØ/1ØØØØØ
@ASG,A SPF*HYDRO.                  Assigns program file
@ASG,TF NEWMAST,U9V                Assigns new master file
@ASG,T XA,F///300                  Assigns sort file
@USE MAST,NEWMAST
@ADD R2PROG*R2PROG.HYDROBUILD      Execute HYDROBUILD
List                  (print a listing of the new file)
     normal SHØ1 data in any order
     no change or delete cards (add cards are SHØ1 cards)
@EOF
```

Do not forget to save the NEWMAST tape!

In order to update an existing master file, use the following runstream:

Update File

```
@RUN,Q/RN RØ2XXX,YOURACCOUNT#,QUALIFIER,15,5ØØØ/1ØØØØØ
@ASG,A SPF*HYDRO.                  Assigns program file
@ASG,T OLDMAST,U9V,FXXXXX          Assigns old master file
```

```
@ASG,TF NEWMAST,U9V                    Assigns new master file
@ASG,T XA,F///300                      Assigns sort file
@USE INN,OLDMAST
@USE MAST,NEWMAST
@ADD R2PROG.HYDROBUILD                 Execute HYDROBUILD
List                              (print a listing)
     add, change, and/or delete cards in any order
@EOF
```

Note that if the "print a listing" card is blank, no new master file listing would have been printed (the same goes for the "new master" runstream).

Remember to save the NEWMAST tape!

You can put messages into the runstream any time after the @RUN card and before the @ADD card. Messages can help keep track of the status of the program that the tape is the 2nd update done by Ted Gilbert, etc.

Error Messages on print file PRIN

1. Duplicate card ignored - Two cards with same location; the second level card is ignored.
2. Legal location already exists - trying to ADD a location on top of one that exists. Card ignored.
3. No matching X (or L) Card - process requires 'L' then 'X' cards. Check to see if another card has a location that falls in between the 'L' and 'X' locations.
4. Location Code does not match 'L' Card - Compare the starting locations on the 'L' and 'X' card for keypunch errors.
5. No matching starting location - For change and delete cards there is no corresponding starting location in the master file.
6. No match found for ending location - (changes or deletes might not be valid) - Messages indicate there is no corresponding ending location in the master file.

Description of the process used by HYDROBUILD -

You will notice that the only difference between the "create" runstream and the "update" runstream is the existence of the file INN. This is how HYDROBUILD tells whether it is to create a new file, or update an existing file (in the case of the update, INN is the old master file).

HYDROBUILD first reads the TABLE-PRINT card (to find whether it should print a listing), then sorts the rest of the card file by legal location (the order that the master {if it exists} should be in). It then merges INN with the card file by inserting ADD cards, deleting records matching DELETE cards, and changing records matching CHANGE cards. The merged file is output to file MAST, while a listing (if requested) is printed. Notice that if INN does not exist and the card file is only ADD cards (which just happen to be SHØ1 cards), the net effect is adding records to a non-existent file, or, in other words, creating a new file.

Sample Runs - HYDROBUILD
Sample 1. -- Create a new file HYDROWIND

```
@RUN,Q/RN RØ2TS4,11Ø261352ØAB,SPF,15,5ØØØ/1ØØØØ
@ASG,A SPF*HYDRO.                    Assigns program file
@ASG,TF HYDROWIND,U9V                 Assigns new master file
@USE MAST,NEWMAST
@ASG,T XA,F///300                     Assigns sort file
@ADD R2PROG*R2PROG.HYDROBUILD         Execute HYDROBUILD
List                    (print a listing)
     The SHØ1 data goes here. It need not be in
     any particular order.
@EOF
```

Sample 2. -- Update the file QWERTY, file number FØ1234.

Since only 7 records will be updated, a new listing may not be needed. Updates are normally $5-$10 a run.

```
@RUN,Q/RN RØ2TS5,11Ø2Ø1352ØXG,SPF,15,5ØØØ/1ØØØØØ
@ASG,A SPF*HYDRO.                    Assigns program file
```

```
@ASG,TF NEWQWERTY,U9V                    Assigns new master file
@ASG,T QWERTY,U9V,FØ1234                 Assigns old master file
@USE INN,QWERTY
@USE MAST,NEWQWERTY
@ASG,T XA,F///300                        Assigns sort file
@ADD R2PROG*R2PROG.HYDROBUILD            Execute HYDROBUILD
blank          (don't print a listing)
60120N0770W01A      (this is a delete card)                    D
60070N0770W01B                                                 D
60120N0730W02C  SMP        (this is an add card)             SHØ1
60130N0700W03AA RSVP GNYCT                                    SHØ1
00120N0345W02D  LP8M   (and a change card)                     C
71620N0012W05A      RNØØ3                                      C
50100N1210W01                                                  D
60070N0770W16A  LP8W                                           L
60070N0770W18C  60070N0770W16A                                 X
60070N0770W27AA 60070N0770W34BB                                D
@EOF
```

Don't forget to save NEWQWERTY!

HYDROIN - (FORTRAN)

This program (consisting of the elements HYDRO and HYDINSMSH) starts the extraction process. Although it does no extraction itself and is not absolutely necessary to the extraction program, it provides an easy-to-learn and consistent interface to the extraction program. HYDROIN also provides parameter checking and a small amount of "goof-proofing" for the extraction program. A decsription of the use of HYDROIN is already given in the first part of this document (see Extract Criteria Statements).

Description of the process used by HYDROIN -

HYDRO is the main program. It keeps track of which category it needs to look at next, decyphers the data it got for the category it is in, checks to see that the data it got was good, and builds the parameter file 7. HYDINSMSH (SMASH) is a subroutine that decyphers and checks the data for the following categories: Forest, County, Forest Service watershed, and Soil Conservation Service watershed.

Since input to this program is already described elsewhere, it will not be covered here.

Output from the program is parameters stored on file 7. This file is not COBOL encoded, so the parameters may be put on file 7 using the text editor, or file 7 may be skipped completely and the parameters put into the extraction program as card data (see description of HYDROXTRACT). The parameters are in the following form:

```
Line-range        : 1xxxxxxxxxxxx        ('1',2I6)
                      from line #
                             to line #
```

each line # must be numeric, and larger than or equal to the previous line # (or 0 for the first line #)

```
Forest            : 3xx                  ('3',A2)
                      forest code (alphabetic)

County            : 4xx                  ('4',A2)
                      county code (alphabetic)

F.S. Watershed    : 5xx                  ('5',I2)
                      watershed code (numeric)

S.C.S. Watershed  : 6xx                  ('6',A2)
                      watershed code (alphanumeric)

Admin. unit       : 7xxxxxx              ('7',A6)
                      Admin. code (alphanumeric)

Legal location    : 8xxxxxxxxxxxxxxxx    ('8',A16)
                      legal location (SHØ1 format)

SHØ1 column-char  :
        include   : 9xxcxxc...xxc        ('9',26(I2,A1)
        exclude   : 2xxcxxc...xxc        ('2',26(I2,A1)
```

x's refer to columns in the range of 01 to 80.
c's refer to the character (may be any character).

Each card is used for a "tied" set of conditions. Unused items on the card are left blank.

Be sure to put all of card code 1 in proper line order and group the other card codes together for proper processing: 1, 1, 1, 3, 6, 6, 6, 9, 9.

If a particular category is to be an excluded category, a record with that category's card code and an asterisk (*) is placed on the file. For instance, say line-range is to be an exclusion category. The following record would be placed on file 7:

```
1*
```

An exclusion flag may not be put on legal location (card code 8), or on the SHØ1 column-char (cards 2, 9).

The criteria records need not be in any order on the parameter file (except for line-range cards; these must be in ascending order). If a category is not to be used, no records of its card type are placed on file 7.

SAMPLE RUNS -

```
   :
   :
```

```
@ADD  R2PROG*R2PROG.HYDROIN
 1-1ØØØ,2ØØØ-4ØØØ,5ØØØ-5ØØØ,9ØØØ-115ØØ
 MB,OR
 (blank card)
 *12,56
 (blank card)
 (blank card)
 (blank card)
 *7=B,13=.,54=x
 (blank card)
```

The above input to HYDROIN would result in the following output on 7:

```
1     1  1ØØ0
1  2ØØØ  4ØØØ
1  5ØØØ  5ØØØ
1  9ØØØ 115ØØ
3MB
3OR
5*
512
556

207B
913.
954x
```

HYDROXTRACT - (COBOL)

This program extracts data from the master file according to the criteria given in HYDROIN and places the data on the temporary disc file OUTT. The temporary file is in the same format as the master file, and thus may be used as the input file for another extract. The process for this is the following:

```
@ADD R2PROG*R2PROG.HYDROIN
  :  first extraction criteria
@FREE OUTT.
@ASG,T DUMPY,F4Ø///2ØØØ          Assigns first extract file
@USE OUTT,DUMPY                   Equate the name OUTT to DUMPY
@ADD R2PROG*R2PROG.HYDROXTRACT    First extract
@ADD R2PROG*R2PROG.HYDROIN
  :  second extraction criteria
@FREE INN                         Free master file as input
@USE INN,DUMPY                    Make extract file input
@ASG,T OUTT,F4Ø///2ØØØ           Assigns second extract file
@ADD R2PROG*R2PROG.HYDROXTRACT    Second extract
@ADD R2PRO*R2PROG.HYDROREP        ... or whatever
```

Another consequence of the temporary file format is that it may be saved as a new master file. The following runstream will accomplish this:

```
@ASG,TF NEWMASTER,U9V             Assigns new master file
@COPY,M OUTT,NEWMASTER
@COPY,M OUTT,NEWMASTER            (must be 3 copies)
@COPY,M OUTT,NEWMASTER
@MARK NEWMASTER
```

Where NEWMASTER is any name you might wish it to be.

Description of the process used by HYDROXTRACT -

HYDROXTRACT first reads the card file until an EOF is encountered. This card file should be in the format described under HYDROIN. (If you remember, HYDROIN placed its parameters on file 7. The following runstream:

```
@ADD 7.
@EOF
```

is used to make 7 act like a card file. This tells the system that 7 is to be used as input, and when 7 has been read, to place an EOF on the card file. (Note that if file 7 is empty, HYDROXTRACT will immediately stop.)

When the program is reading this data, the data is telling the program to set exclusion flags for categories, set criteria in categories, and to ignore other categories by not having any records with that category's card code. When an EOF is encountered, the program starts reading file INN.

INN is the file that the data is to be extracted from. It is in master file format, of course, since usually it is a master file. The records are first compared to criteria in exclusion categories in order of card code (i.e., line-ranges, forest county, F.S. watershed, ...). If the record matches any of the criteria, the program reads another record and starts the comparison again. If the record matched none of the exclusion criteria, it is then compared to the inclusion criteria, again in order of card code (line-range, forest, county, F.S. watershed, S.C.S. watershed, ...). If the record matches any of the inclusion criteria, it is written on file OUTT. If it matches none of the inclusion criteria, the program reads another record and starts the comparison again. Thus it can be seen that a given record will be extracted only if it doesn't match any exclusion criteria, and if it does match at least one inclusion criteria.

When HYDROXTRACT reaches an EOF on INN, or a line number larger than the largest line range given, it places an EOF on OUTT and prints the number of records it read and the number of records it extracted.

As a final note, it must be said that HYDROXTRACT performs NO error checking on input criteria, nor does it check the input master file to insure that it is in SHØ1 format. HYDROXTRACT assumes that input criteria have come from HYDROIN, and thus have been checked for errors. As for checking for the SHØ1 format, it has been found that this package is useful for data other than SHØ1, and so checking for the format would take away some of the package's usefulness.

HYDROREP - (COBOL)

This program takes data in master file format, sorts it, and prints it according to table codes given by the user (see 'List of Tables Available Under the Program - Hydrologic Report').

Description of the process used by HYDROREP -

The input to this program is already described in Chapter 3 of this document and will not be repeated here. As each table-card is read, the table-number is checked against the table-

numbers available. If there is not a matching number, another table card is read and the process repeated. If the table-number is ØØ, the program is stopped. If there is a matching table number, then file OUTT is sorted using file XA as a sort file, and using whatever keys as are needed by the table. The sorted file is then printed, along with acreage totals specified by the table (which are accumulated during the print). After the table is printed, another table-card is read.

Note that since file OUTT is in master file format, an actual master file may be used as input for a report without going through an extract. The following runstream will do this:

```
@RUN . . .
@ADD R2PROG*R2PROG.HYDROSTART
@ASG,T OLDMAST,U9V,FXXXXX          Assign old master
@FREE OUTT
@USE OUTT,OLDMAST                  Use old master as input
@ADD R2PROG*R2PROG.HYDROREP
```

.
.
.

Description of the ADD Streams Used

These ADD streams were used in order to simplify the package for the beginner. It might be noted that the program file SPF*HYDRO is a cataloged tape file, and so it doesn't need a tape number to be assigned (this is automatically taken care of by the stream; see the ADD stream HYDROSTART for an example). SPF*HYDRO was saved this way to save maintenance cost.

HYDROSTART - part of ADD stream

This runstream assigns the program tape file, parameter file, sort file and extract file used in a normal extract. It also reads in the needed programs. Its contents are:

```
@ASG,A SPF*HYDRO.                  Assigns program file
@ASG,T 7.                          Assigns parameter file
@ASG,T OUTT,F4Ø///2ØØØ            Assigns extract file
@ASG,T XA,F4Ø///3ØØØ               Assigns sort file
@COPIN,A SPF*HYDRO.,TPF$           Copies In Needed Programs
@FREE SPF*HYDRO.                   Don't Need It Anymore
```

HYDROIN -

This runstream executes the program HYDROIN.

```
@XQT HYDROIN
```

HYDROXTRACT -

This runstream executes the program HYDROXTRACT and adds the contents of the parameter file to runstream. The contents:

```
@XQT  HYDROXTRACT
@ADD  7.                          Give parameters to extract
@EOF
```

HYDROREP -

This runstream executes the program HYDROREP. Its contents:

```
@XQT  HYDROREP
```

HYDROTIM/REP -

This runstream creates a file for printing and then BRKPT's the output to the file. It is used in timeshare for printing large tables without having the output come out on the terminal. Its contents:

```
@ASG,CP  PRINT(+1)                Assign a file to print on
@USE  C,PRINT(+1)                 And make the name easy
@BRKPT  PRINT$/C                  Move following Output to C
```

HYDROTIM/OUT -

This runstream is the the counterpart to HYDROTIM/REP. It BRKPT's the output back to the terminal, and then SYM's the print file to site-id FCRØØ6:

```
@BRKPT  PRINT$                    Bring output back to terminal
@FREE  C                          Save print file
@SYM  PRINT(+1),FCRØØ6            Print the file at FRCØØ6,
                                  and destroy it when done
```

HYDROBUILD -

This runstream executes HYDROBUILD:

```
@FIND,A  SPF*HYDRO.HYDROBUILD      Find the program
@COPIN,A  SPF*HYDRO.HYDROBUILD,HYDROBUILD
@XQT  HYDROBUILD
```

All these runstreams are stored on R2PROG*R2PROG.

How to Update the SPF*HYDRO Program File

When the program file needs to be updated, you must delete the old file and assign the same name to the new file. If you do not do this a "Facility Reject" will haunt your days. A partial runstream is:

```
   .                              - Copin program elements
   .                                from old tape that are to
   .                                go on new tape.
   @DELETE,C SPF*HYDRO.           - Delete old file
   @ASG,CP SPF*HYDRO.             - Assign new file
   .                              - Copout old or update
   .                                program elements.
   .
```

HYDRORABBIT

This runstream executes HYDRORABBIT resulting in punched card output. This is useful in extracting particular records for further processing.

HYDROIN

```
   .
   .
   .
@XQT TPF$.HYDRORABBIT
@ADD  7.
@EOF
```

FLOWCHART FOR THE HYDRO PACKAGE